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SOLDIER'S MANUAL and TRAINER'S GUIDE

MOS 31W

SOLDIER'S MANUAL AND TRAINER'S GUIDE MOS 31W TELECOMMUNICATIONS OPERATIONS CHIEF

Skill Levels 4 and 5

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CHAPTER 2

Trainer's Guide

2-1. General. The MOS Training Plan (MTP) identifies the essential components of a unit training plan for individual training. Units have different training needs and requirements based on differences in environment, location, equipment, dispersion, and similar factors. Therefore, the MTP should be used as a guide for conducting unit training and not a rigid standard. The MTP consists of two parts. Each part is designed to assist the commander in preparing a unit training plan which satisfies integration, cross training, training up, and sustainment training requirements for soldiers in this MOS.

Part One of the MTP shows the relationship of an MOS skill level between duty position and critical tasks. These critical tasks are grouped by task commonality into subject areas.

Section I lists subject area numbers and titles used throughout the MTP. These subject areas are used to define the training requirements for each duty position within an MOS.

Section II identifies the total training requirement for each duty position within an MOS and provides a recommendation for cross training and train-up/merger training.

- **Duty Position column.** This column lists the duty positions of the MOS, by skill level, which have different training requirements.
- **Subject Area column.** This column lists, by numerical key (see Section I), the subject areas a soldier must be proficient in to perform in that duty position.
- **Cross Train column.** This column lists the recommended duty position for which soldiers should be cross trained.
- **Train-up/Merger column.** This column lists the corresponding duty position for the next higher skill level or MOSC the soldier will merge into on promotion.

Part Two lists, by general subject areas, the critical tasks to be trained in an MOS and the type of training required (resident, integration, or sustainment).

- **Subject Area column.** This column lists the subject area number and title in the same order as Section I, Part One of the MTP.
- **Task Number column.** This column lists the task numbers for all tasks included in the subject area.
- **Title column.** This column lists the task title for each task in the subject area.
- **Training Location column.** This column identifies the training location where the task is first trained to soldier training publications standards. If the task is first trained to standard in the unit, the word "Unit" will be in this column. If the task is first trained to standard in the training base, it will identify, by brevity code (ANCOC, BNCOC, etc.), the resident course where the task was taught. Figure 2-1 contains a list of training locations and their corresponding brevity codes.

ANCOC	Advanced NCO Course
UNIT	Trained in the Unit
SNCOC	Senior NCO Course

Figure 2-1. Training Locations

- **Sustainment Training Frequency column.** This column indicates the recommended frequency at which the tasks should be trained to ensure soldiers maintain task proficiency. Figure 2-2 identifies the frequency codes used in this column.

BA	- Biannually
AN	- Annually
SA	- Semiannually
QT	- Quarterly
MO	- Monthly
BW	- Bi-weekly
WK	- Weekly

Figure 2-2. Sustainment Training Frequency Codes

- **Sustainment Training Skill Level column.** This column lists the skill levels of the MOS for which soldiers must receive sustainment training to ensure they maintain proficiency to soldier's manual standards.

2-2. Subject Area Codes.

Skill Level 4

- 1 Communications Security (COMSEC)
- 2 Signal System/Network Planning
- 3 Signal System/Network Engineering
- 4 Signal System/Installation Operations
- 5 Signal Network/Site Management

2-3. Duty Position Training Requirements.

2-4. Critical Tasks List.**MOS TRAINING PLAN
31W4****CRITICAL TASKS****Skill Level**

Subject Area	Task Number	Title	Training Location	Sust Tng Freq	Sust Tng SL
1. Communications Security (COMSEC)	113-573-0001(P)	CHECK SIGNAL SECURITY (SIGSEC) PROCEDURES	ANCOC	SA	4-5
	113-573-5002(P)	CHECK IMPLEMENTATION OF ELECTRONIC COUNTER-COUNTERMEASURES PROCEDURES	UNIT	SA	4-5
	113-606-2051	CHECK THE ESTABLISHMENT OF A SECURE DIGITAL GROUP MULTIPLEXING RADIO ASSEMBLAGE	ANCOC	AN	4-5
2. Signal System/Network Planning	113-611-1013	PERFORM SITE RECONNAISSANCE	ANCOC	AN	4-5
	113-611-6111(P)	PLAN AN EAC NETWORK	ANCOC	AN	4-5
	113-625-2076(P)	PLAN AN ECB NETWORK USING THE SCC	ANCOC	MO	4-5
	113-625-2107(P)	PLAN AN MOBILE SUBSCRIBER EQUIPMENT (MSE) NETWORK USING MOBILE SUBSCRIBER EQUIPMENT-NETWORK PLANNING TERMINAL (MSE-NPT)	ANCOC	QT	4
3. Signal System/Network Engineering	113-611-5014	PREPARE THE SIGNAL ANNEX TO THE OPERATIONS ORDER (OPORD)	ANCOC	SA	4-5
	113-613-5006(P)	ENGINEER AN EAC NETWORK	ANCOC	AN	4-5
	113-625-2077(P)	ENGINEER AN ECB NETWORK USING THE SCC	ANCOC	MO	4-5
	113-625-2108(P)	ENGINEER A MOBILE SUBSCRIBER EQUIPMENT (MSE) NETWORK USING MOBILE SUBSCRIBER EQUIPMENT - NETWORK PLANNING TERMINAL (MSE-NPT)	ANCOC	AN	4
4. Signal System/Installation Operations	113-603-1049(P)	INSTALL A COMMUNICATIONS SYSTEM CONTROL ELEMENT (CSCE)	ANCOC	AN	4-5
	113-606-2051(P)	CHECK THE ESTABLISHMENT OF A SECURE DIGITAL GROUP MULTIPLEXING RADIO ASSEMBLAGE	ANCOC	AN	4-5
	113-609-6003	DISTRIBUTE COMMUNICATIONS SECURITY (COMSEC) KEYS	UNIT	AN	4-5

CRITICAL TASKS			Skill Level		
Subject Area	Task Number	Title	Training Location	Sust Tng Freq	Sust Tng SL
	113-611-5016(P)	DIRECT THE ESTABLISHMENT OF SITE DEFENSE	ANCOC	SA	4-5
	113-625-7004(P)	DIRECT THE ESTABLISHMENT OF A NODE CENTER AT ECB	ANCOC	SA	4-5
	113-625-7010(P)	VERIFY THE ESTABLISHMENT OF A RADIO ACCESS UNIT (RAU)	ANCOC	AN	4-5
5. Signal Network/Site Management	113-603-2199(P)	CONTROL COMMUNICATIONS SUPPORT USING COMMUNICATIONS SYSTEM CONTROL ELEMENT (CSCE)	ANCOC	AN	4-5
	113-608-6001	PRESENT AN INFORMAL C-E SITUATION BRIEFING	ANCOC	SA	4-5
	113-623-7119(P)	DIRECT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)	ANCOC	AN	4-5
	113-625-2078(P)	MANAGE AN ECB NETWORK USING THE SCC	ANCOC	SA	4-5
	113-625-6001(P)	MANAGE THE TACTICAL PACKET NETWORK (TPN)	SNCOC	AN	

CHAPTER 3**MOS/Skill Level Tasks****Skill Level 4****Subject Area 1: Communications Security (COMSEC)****CHECK THE ESTABLISHMENT OF A SECURE DIGITAL GROUP MULTIPLEXING RADIO ASSEMBLAGE****113-606-2051**

Conditions: Given an active signal node with DGM radio assemblages, unit operation order/operation plan(OPORD/ OPLAN), DGM terminal configuration crew assignment sheets, paper maps of area of operation, compass, and operational site diagram.

Standards: The standards are met when you have checked the establishment of a secure digital group multiplexing radio assemblage to ensure it meets the mission requirements of your unit.

Performance Measures	Results	
1. Review the OPORD/OPLAN to determine the site location.	P	F
2. Ensure preliminary checks have been completed.	P	F
3. Check the installation of the multiplexing radio assemblages.	P	F
4. Check the initialization of the multiplexing radio assemblages.	P	F
5. Evaluate performance and make corrections required.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References**Required**

TM 11-5820-864-12-1
 TM 11-5820-865-12-1
 TM 11-5820-926-12-1
 TM 11-5820-931-12-1
 TM 11-5820-934-13-1-1
 TM 11-5820-934-13-1-2

Related

CHECK IMPLEMENTATION OF ELECTRONIC COUNTER-COUNTERMEASURES PROCEDURES 113-573-5002(P)

Conditions: Given the requirement to check the implementation of ECCM procedures, an active communications site/node, a meaoning, intrusion, jamming, interference(MIJI) source, and FM 24-33.

Standards: Standards are met when you have checked the implementation of electronic counter-countermeasures procedures, performance measures 1 through 5 have been completed, and all faults have been corrected and reported to your supervisor.

Evaluation Preparation: Setup: A radio set operating in a radio net with interference applied to the system. Brief soldier: As the supervisor of an operator, you must check to ensure that the operator is applying proper tactics to a jammed system.

Performance Measures

Results

NOTE: All performance measures refer to FM 24-33.

1. Checks to ensure radio operators are minimizing transmissions(chap 2).	P	F
a. Ensure all transmission are necessary.	P	F
b. Preplan all messages before transmitting them.	P	F
c. Transmit quickly and precisely.	P	F
d. Use equipment capable of data burst transmission.	P	F
e. Use an alternate means of communication when possible.	P	F
2. Ensure operators protect transmission from enemy interception.	P	F
a. Use low power.	P	F
b. Select proper antenna.	P	F
c. Use the antenna with the shortest feasible range.	P	F
d. Use directional antennas.	P	F
e. Select a site that mask transmitted signals from enemy interception.	P	F
f. Use mobile antennas.	P	F
g. Use decoy antennas.	P	F
h. Use steerable null antenna processors.	P	F
3. Checks to see if radio operators are practicing proper authentication procedures.	P	F
a. Reduce operator distinguishing characteristics.	P	F
b. Operate on a random schedule.	P	F
c. when using non secure communications means.	P	F
d. Encrypt all EEFI category data.	P	F
e. Use PROWORDS.	P	F
NOTE: Ensure that operators submit a MIJI report.		
4. Checks to see if radio operators can overcome jamming/interference.	P	F
a. Determine whether the interference is internal or external to the radio.	P	F
b. Determine whether the interference is jamming or unintentional.	P	F
c. Report jamming/interference incidents.	P	F
5. Checks to see if radio operators can	P	F
a. Continue to operate.	P	F
b. Improve the signal-to-jamming ratio.	P	F
c. Adjust the receiver.	P	F
d. Increase the transmitter power output.	P	F
e. Adjust or change the antenna.	P	F
f. Establish a retransmission station.	P	F
g. Relocate the antenna.	P	F
h. Use an alternate route of communications.	P	F

Performance Measures

- i. Change frequencies.
- j. Acquire another satellite(if required).

Results

P	F
P	F

Evaluation Guidance: Score the soldier GO if all steps are passed (P). Score the soldier a NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
FM 24-33

Related
FM 34-62

CHECK SIGNAL SECURITY (SIGSEC) PROCEDURES**113-573-0001(P)**

Conditions: Given a requirement check SIGSEC procedures of an established signal node with organic crypto systems, and AR 380-40, and the unit operation order/operation plan (OPORD/OPLAN).

Standards: The standards are met when emission, physical, crypto, transmission, and electronics requirements of security are checked and corrective action is taken for any discrepancy noted.

Evaluation Preparation: Setup: Different types of signal operational requirements will be in effect for this task. Brief Soldier: You are required to check SIGSEC at the signal area node and make the necessary corrections.

Performance Measures	Results	
1. Review the mission OPOD/OPLAN and AR 380-40, to determine specific SIGSEC policies prior to inspecting the signal node.	P	F
2. Check emission security.	P	F
3. Check physical security.	P	F
a. Signal node area of operation.	P	F
b. Area where a cryptosystem is employed.	P	F
c. Emergency evacuation and destruction plans.	P	F
d. Handling of classified material waste.	P	F
e. Control of access and crypto safeguards.	P	F
f. Identify physical insecurities.	P	F
g. Identify personnel insecurities.	P	F
4. Check cryptographic security.	P	F
a. Proper utilization of cryptosystems.	P	F
b. Encryption of all classified information.	P	F
c. Competent operation of cryptosystems.	P	F
d. Identify crypto insecurities.	P	F
5. Check TRANSEC.	P	F
a. Radio communications.	P	F
b. Conventional telephone communications.	P	F
6. Direct appropriate corrective action for any discrepancy noted.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
AR 380-40

Related
AR 380-5
AR 530-1
FM 19-30
FM 24-18
IT0464
SS 0456
SS 0496
TB 380-40(1-5)

Subject Area 2: Signal System/Network Planning

PLAN AN ECB NETWORK USING THE SCC**113-625-2076(P)**

Conditions: Given the requirement to plan a network to deploy a corp/division signal brigade, mission statement/commander's battle plan, predeployment software support (PDSS) for corps/division, user request for service, team screens and printouts from the system control center (SCC), and maps.

Standards: The standards are met when you have planned an ECB network to meet the requirements of your unit operation order/operation plan (OPORD/OPLAN) and is approved by battalion/brigade S3.

Performance Steps

1. ECB is the command and control communication system for corps and below. The area coverage function provides a secure, automatic, digital network to enable access for both mobile subscribers and wire subscribers from anywhere within the corps area of operations. Area coverage is provided by equipment which processes, routes, and extends subscriber calls throughout the mobile subscriber equipment (MSE) system. The area coverage function also utilizes integrated internodal trunking, radio access to mobile and wire subscriber functions, communications security (COMSEC), and system control. It interfaces with other elements of the MSE system to process and route secure voice, data, and facsimile communications between subscribers. This functional area provides the tandem switched network function. It provides flood search routing within the system and interfaces with non-MSE networks, such as ECB. Area coverage includes a network of node centers (NC), each consisting of a node center switch (NCS), radio access units (RAU), line-of-sight (LOS) terminals, a node management facility (NMF), and a node support vehicle (NSV). The large extension nodes (LEN) and small extension nodes (SEN) contain the LEN switch (LENS) and the SEN switch (SENS). They provide wire subscribers at the various command posts (CP) access to the MSE network. The LEN and SEN are commonly referred to as the subsystem that provides wire subscriber access. The RAU is the subsystem that permits the mobile subscribers access to the MSE network.
2. OPORD.
 - a. At the end of the planning phase, the OPORD is produced and distributed. The automated capabilities of the SCC can greatly increase the efficiency of this process. Each successful LOS path profiling project that is completed during the planning phase can be printed and distributed to the units responsible for installation.
 - b. Plan a schedule of events so the command knows exactly what is expected. Include the items below in the schedule.
 - (1) A concept briefing to commanders and staff.
 - (2) A technical control meeting with platoon leaders, platoon sergeants, and switch supervisors. (This meeting should cover how to perform MSE and non-MSE interfaces.)
 - (3) A back brief to brigade/battalion operations.
 - (4) A final OPORD briefing to commanders, staff, and NC leadership. (Issue the OPORD at this time.)
 - (5) The final team packets are issued to battalions for distribution to teams.
 - c. The five-paragraph format of the OPORD is still used. The following key points are mandatory when publishing MSE plans or annexes.
 - (1) Edition of database tapes.
 - (2) COMSEC key distribution.
 - (3) Number of RAU/mobile subscriber radiotelephone terminal (MSRT) frequency plans and designation of the active plan.
 - (4) Locations, distribution, loading, and priorities for preaffiliation lists (PALs).
 - (5) Gateway area codes.
 - (6) Priority of RAU coverage (where RAUs should provide coverage).

Performance Steps

(7) SCC locations.

3. User requirements.

- a. Signal planners must use command guidance to determine which headquarters will receive support. This determines the method or type of signal support to satisfy command, control, and communications (C3) requirements including connectivity with adjacent units, ECB, and host nation's communications resources.
- b. CP priorities must be established and published in the OPORD or unit SOP. Installing the backbone has top priority. Once the backbone has good connectivity, the local and remote RAUs are connected; followed by the major headquarters. Examples are the corps main, corps tactical, division main, and division tactical CPs. Only the SCC/system control (SYSCON) can direct deviations from the assigned priorities.
- c. The planner needs the initial locations of all units needing support and, if possible, any planned jump locations.
- d. The planner also needs to know all special requirements of the supported units, such as commercial access, tactical satellite (TACSAT), special telephone features, profiles, and fixed telephone directory changes.
- e. The SCC/SYSCON ensures backbone priorities are established for each NC. The planner must ensure an NC is not scheduled to establish two links at the same time.

4. Planning guidelines.

NOTE: Mission and unit SOP will determine specific planning guidelines.

- a. The general planning guidelines for the ECB system are basically the same as for any communications system.
- b. The following represents a general planning list:
 - (1) Identify the requirements for the OPLAN.
 - (2) Review the mission and user request.
 - (3) Determine the availability/interoperability of equipment.
 - (4) Obtain equipment condition status.
 - (5) Allocate resources based upon availability and OPLAN mission.
 - (6) Outline shortfalls.
 - (7) Engineer the network and link-up with other networks.
 - (8) Allocate capabilities.
 - (a) Dial central office (DCO) access.
 - (b) Precedence.
 - (c) Security classmarks.
 - (9) Identify network management (Active and Reserve SCC).
 - (10) Determine restoral capability (uncommitted equipment).
 - (11) Prepare emergency plans (essential user bypass [EUB] and duplication list).
 - (12) Prepare database.
 - (13) Position redundant (spare) equipment at key positions.
 - (14) Plan and coordinate COMSEC generation distribution.
 - (15) Get TACSAT time.
 - (16) Conduct planning conferences.
 - (a) Nodal.
 - (b) Divisional.
 - (c) Corps.
 - (d) ECB.
 - (e) Task force.
 - (f) Commercial.
 - (g) TACSAT.

5. Planning process.

- a. Review the tactical situation and the commander's guidance/intent.

Performance Steps

- b. Develop an overlay showing the corps and division boundaries and unit location down to brigade level. Include any separate battalions (as needed) that require communications support. Annotate the overlay with the number of MSRTs and wire line subscribers that require support.
 - c. Once you have completed plotting the general areas of usage for the MSRTs and the more specific locations of the wire line subscribers, choose your RAU locations. Use the high point data to pick locations that will provide the best coverage, ensure all possible areas in the corps/division are covered, and high density MSRT areas (over 25) are covered by more than one RAU. Before laying out the RAUs, check the adjacent divisions and the corps RAU locations to determine to what extent their RAU coverage overlaps your area.
 - d. Determine the extension node locations based on the density of wire line subscribers and location of the supported CPs.
 - e. Determine the NC locations by looking at the proposed RAU locations to determine which of them would also support the extension nodes with LOS connectivity. NC site selection is based largely on the LOS radio links required to tie in the extension nodes and remote RAUs to the backbone network. The locations may have to be adjusted to ensure LOS is available. Connect the NCs to the extension nodes and to the remote RAU locations, ensuring each LOS system is feasible. (The SCC signal path profiling feature allows you to calculate the probability of establishing an LOS shot between any two points on your map.) If there are any areas not covered, mark them for net radio interface (NRI) service and place your NRIs to fill the gaps.
6. Automated frequency management for MSE assets is performed at each SCC work station assigned the appropriate function. The SCC automatically engineers and assigns LOS frequencies for internodal, extension, and super high frequency (SHF) radio links used in the ECB system. The selection of the band to be used for a specific ultra high frequency (UHF) or SHF radio link is made by a network planner and provided to the SCC operator, based on the availability of UHF/SHF equipment. The corps SCC also generates RAU/MSRT frequency plans. Upon approval, the plans are transmitted to the group logic unit (GLU) of all connected RAUs. These RAU/MSRT frequency plans are used by all the RAUs and MSRTs of the MSE network.
7. Prepositioned COMSEC keys are required at the NC/LEN, SEN, RAU, and each MSRT subscriber until a connecting network is formed and the SCC can perform a rekey operation. To prepare for COMSEC rekeying, the signal orders must specify the primary and secondary NC as well as the COMSEC leaders/followers to establish responsibility for key distribution during the key cycle.
 - a. The planner must ensure the brigade network technician distributes the prepositioned key set to the battalion network technicians. MSE will not work unless the correct keys are in the correct places in all equipment. Planners must coordinate with adjacent corps and ECB for gateway keys before deployment. A sound key management plan must be understood and practiced by all operators and taught to all subscribers.
 - b. Issue prepositioned keys to the teams, IAW COMSEC, in the staging area on the day of deployment. The assistant corps signal officer (ACSO)/assistant division signal officer (ADSO) coordinates COMSEC key distribution to all corps and division MSRT users.
 - c. Maintain COMSEC accountability for all keys distributed to each element in the network. Prepositioned COMSEC keys at specified locations ensure the switches and users have the keys needed to operate specific pieces of equipment, such as switches, MSRTs, and RAUs. The accountability process provides the feedback required to accurately determine where keys are located throughout the network. COMSEC manager worksheets are designed to help network managers plan and conduct orderly distribution of COMSEC keys to MSE teams. Completed worksheets also provide an accounting record for initial key distribution.
8. EUB. If an NCS or LENS processor fails, the MSE EUB function electronically bypasses the failed switch and transfers essential user access trunk groups directly connected to the failed NCS or LENS to an adjacent NCS. This feature ensures virtually no interruption in essential user service during a processor failure because all essential users are reaffiliated at the adjacent NC. A minimal loss of service will occur during the time the subscribers are affiliated with the parent NCS or LENS that has been returned to service.

Performance Steps

9. PAL requirements.

- a. Databases have been developed that will create telephone numbers for MSE fielded units. These databases will permanently assign a unique telephone number for each position.
- b. The databases will be updated according to operational facility (OPFAC) rules, needs from the field, and changes in doctrine.
- c. The PALs identify subscribers likely to affiliate with the network, define the unique subscriber numbers, and the profile (class of service) each customer receives. Developing the PAL is the most important part of creating the database. There can be up to 997 PALs within the network. Each PAL can contain a maximum of 200 subscribers. Each list is developed according to unit, command structure, or community of interest, such as intelligence and chemical. Doctrinal guidelines for developing PALs are shown below.
 - (1) Telephone numbers will be assigned using the fixed directory plan and Standardization Agreement (STANAG) 5046. The entire list must be reviewed and conflicts in numbering codes resolved by the corps or division signal office. This will avoid confusion when the units deploy. Units still need to publish corps and division telephone directories.
 - (2) A subscriber's number with its associated profile must appear on only one list.
 - (3) PALs should initially be developed along task organized lines.
 - (4) A subscriber's digital nonsecure voice terminal (DNVT) and MSRT number should appear on different PALs. They should not appear on the same PAL.
 - (5) PALs will be grouped as follows: 001-099 corps 100-199 division 1 200-299 division 2 300-399 division 3 400-499 division 4 500-599 division 5 600-699 division 6 700-799 division 7* 800-899 special separate units, special operations* 900-999 corps *Reserve PALs 700-899 to support special contingencies such as an out-of-corps unit attached for special missions.
 - (6) Data terminal access numbers are not included on PALs.
 - (7) Group all signal battalion MSRT numbers on one PAL. This allows the signal numbers required for network control to be activated in the first operational node switch (NS) and ensures signal managers have immediate access to the evolving network.

NOTE: Worksheets discussed in the following section are included only as a guide during deployment and during changes in deployment of the MSE system.

10. System manager worksheets.

- a. The system manager worksheet (deployment) shows the information a system manager derives from a paper map. Give the completed worksheet to an SCC operator for entry into the database. The planning guide given at the bottom of the worksheet shows the maximum number of projects that need to be created for the movement of an operational team (NC, LEN, SEN, remote RAU).
- b. LEN movement. The critical information required for planning this action indicates the link and site shutdown times, the time of LEN arrival at the new site, and the type of communication links that need to be planned. After the situation is reviewed for COMSEC requirements, the worksheet is returned to the system manager for approval and then given to the operator for execution. Upon completion of all projects, the operator annotates the generated messages in the remarks column and returns the worksheet to the system manager.
- c. NC movement. The most important goal of the system manager worksheet is to resolve the links disturbed by movement of the NC. An NC probably has few active links just before movement, because most links have already been transferred to avoid interruption of service. If an associated SEN moves itself during, or immediately prior to any movement of the NC, it can be considered an activity independent of the NC movement and not a disturbance caused by the movement of the NC.

Performance Steps

- d. Borrowing/loaning SENs. In the event SEN associates with an NC that is not from its parent battalion, worksheets from the lending and borrowing NCs are completed. A COMSEC worksheet is completed, if required. These worksheets become part of the packets of both SCCs. The action begins with a phone conversation between the two S3/SCCs. This resolves questions of why the borrowing is needed, what administrative and logistics details are involved, and what time constraints exist. After this conversation, the system managers at both SCCs fill out their respective worksheets. When the SEN is to be returned to its parent battalion, another set of these worksheets is completed, even if the SEN only goes into reserve status, since it must be dropped from the borrowing battalion and reassigned to its parent battalion.
 - e. RAU activation. The SCC system manager completes the following requirements to activate an RAU that has been in reserve status:
 - þ Order RAU to a site.
 - þ Establish link with a node.
 - þ Perform COMSEC transfer.
 - þ Load frequency plan.
 Complete the first two requirements on the same worksheet. Complete the second two requirements on separate worksheets.
 - f. The system manager worksheet shows the information required to add or delete subscriber directory numbers, activate switch PALs, and change subscriber profile numbers.
11. RAU coverage and layout.
- a. The RAU (AN/TRC-191) provides network access to mobile radiotelephone subscribers. The RAU can be deployed adjacent to a local NC or remoted by means of the LOS radio (AN/TRC-190(V)1).
 - b. The mobile subscriber gains network access through the RAU. The signal planner deploys RAUs to provide battlefield coverage. One RAU can provide a 15-kilometer (9.3-mile) radius area coverage (planning range) in the area of operations. Following initial affiliation, mobile subscriber affiliation is maintained automatically as it moves from one RAU range to another. If the mobile subscriber is engaged in a telephone conversation and leaves the range of the servicing RAU, the conversation is terminated and must be redialed.
 - c. The RT-1539(P)/G MSRT and RAU radios are identical and interchangeable. In the MSRT or RAU, the radio operates in a full-duplex mode with a high and low frequency band for transmit and receive channels. In the RAU, the radio transmits in the high band and receives in the low band. This procedure is reversed when the radio is used in the MSRT configuration.
 - d. The RAUs are generally used in local (collocated with a node switch [NS]) and remote arrangements. This does not mean that both RAUs cannot be remoted. This depends on the availability of an LOS assemblage for support. The RAUs closest to the forward edge of the battle area (FEBA) use emitter masking techniques because the RAU constantly emits a marker beacon declaring its availability to affiliated MSRTs. With this in mind, the node platoon leader/sergeant must make important tactical deployment decision about SIGSEC.
12. Placement of extension links.
- a. The LEN provides local switching and network access for up to 164 digital subscribers. A LEN provides service for large concentrations of users, such as corps support command (COSCOM)/division support command (DISCOM) or corps/division main. The LEN consists of an operation group (OG) shelter and an switching group (SG) shelter. The AN/TRC-190(V)4 LOS radio provides network connectivity.

Performance Steps

- b. The SEN provides local switching and network access for 26 subscribers (AN/TTC-48(V)1) or 41 subscribers (AN/TCC-48(V)2). A habitual relationship may be established and maintained between extension nodes, including LOS teams and the division CP. The same relationship may be established with corps combat unit CPs (such as armored cavalry regiments [ACR], artillery brigades, or air defense artillery [ADA] brigades). While a habitual relationship may be desired for tactical familiarity and ease in support, MSE extension nodes do not revert to a reserve role when the supported CP/unit assumes a reserve role. In these situations, MSE extension nodes are assigned a revised support role. Habitual relationships may be reestablished when the affected elements return to an active role. In the corps area of operations, essential command and control (C2) facilities (division main, corps main corps rear, and tactical CPs) should be provided dual LOS network connectivity. This entails assigning additional and redundant extension facilities (SENs/LENSs).

13. Operational readiness/internodal link requirements.

- a. An NC is considered operational when one NCS-to-LOS radio link to another LOS-to-NCS is completed, four extension nodes and remote RAUs are ready (interconnected to the switch, antenna erected and aligned, multichannel radio on and tuned), the node processors and related equipment are ready to process traffic, and the local RAU is connected and ready to accept affiliation calls from terminals. A LEN or SEN is considered operational when at least one access LOS link (or access cable link or SHF radio link) is ready and the node processors and other common equipment are ready to accept traffic from wire subscribers. Setup time for an NCS begins when the LOS and RAU shelters arrive on a properly leveled and cleared site. Setup time for a LEN begins when the shelters arrive on a properly leveled and cleared site and all required subscriber remote multiplexer combiners (RMC) and junction boxes are preinstalled and connected to the LENS.

NOTE: Only the 9-meter and 15-meter masts are install. Use of the 30-meter mast is not considered a typical or normal deployment.

- b. Teardown time for the NCS begins when the last internode LOS link is disconnected. The system is considered unavailable after a maximum time of 10 minutes during switchover/reaffiliation.

14. Ring code management considerations.

- a. The battalion signal operation instructions (SOI) must reflect the basic ring tone/channel assignments. Any conflicting or duplicating ring codes that affect the operation of the digital voice orderwire (DVOW) system must be referred to the corps or division SCC which controls that link. The corps or division SCC must keep an up-to-date diagram of ring tone assignments for all links and coordinate closely with other SCCs on cross boundary links.
- b. Due to the inability of the NS DVOW to serve all possible DVOW connections, the node platoon leader will decide on priority users for connection to the DVOW system. The node platoon leader must ensure engineering communications are passed by other means to the shelters which do not have the DVOW. DNVTs may be connected through the 24 local loops and used for this propose.
- c. All NMFs must keep local diagrams showing all ring tone assignments and changes to channel connections due to faults.

Performance Measures**Results**

- 1. Determine mission requirements. (Refer to the mission statement/commander's battle plan, OPORD/OPLAN, SOP, and PDSS.)

P F

NOTE: The remaining performance measures are steps in the tedious process of planning a network. They do not have to be done in any order and, in a few cases, not all steps will have to be performed.

- 2. Determine user/friendly forces requirements (mission statement and user service requests).

P F

Performance Measures**Results**

NOTE: Identify those units and personnel that are attached/detached during operation.

3. Determine/evaluate the threat impact on mission.	P	F
a. Review intelligence reports.	P	F
b. NBC reports.	P	F
c. Enemy size/movement.	P	F
d. Any other situation that proves to be a threat.	P	F
4. Determine the availability of equipment and interoperability of sources.	P	F
5. Outline shortfalls.	P	F
NOTE: Performance measures 6 and 7 are normally performed simultaneously but may be performed separately.		
6. Allocate resources.	P	F
a. Allocate 30-meter mast assets.	P	F
b. Allocate SHF radio assets.	P	F
c. Allocate satellite assets (for corps and above only).	P	F
d. Allocate KY-90 assets.	P	F
e. Allocate very high frequency (VHF) radio assets.	P	F
7. Identify overlay requirements for:	P	F
a. Plotting corps/division boundaries.	P	F
b. Plotting LENSs.	P	F
c. Plotting RAUs.	P	F
d. Plotting NCs.	P	F
8. Coordinate operational requirements for the following classmark database assignments.	P	F
a. Automatic digital network (AUTODIN) access.	P	F
b. Commercial access.	P	F
c. Gateway for echelons above corps (EAC) access.	P	F
d. Satellite access (ECB only).	P	F
9. Prioritize link activation.	P	F
10. Identify equipment for standby/reserve.	P	F
11. Determine LOS frequency plan requirements.	P	F
12. Determine VHF plan requirements for RAU/MSRT and frequency modulation (FM) net.	P	F
13. Determine internodal link requirements.	P	F
14. Determine EUB requirements.	P	F
15. Determine PAL requirements.	P	F
16. Identify project/assignment worksheet requirements to be prepared for the AN/TYQ-46 operator to input into the SCC database.	P	F
17. Identify modifications to each NS standard database.	P	F
18. Identify order messages to change/modify the NS database.	P	F
19. Identify modification to each LENS standard database.	P	F
20. Identify order message to change/modify the LENS database.	P	F
21. Identify (specify) ring codes for the communications modem (CM).	P	F

Performance Measures	Results	
22. Determine COMSEC control and preposition requirements to include:	P	F
a. COMSEC bulk transfer requirements and procedures.	P	F
b. Designate the primary NC.	P	F
c. Designate the personnel to be issued the preposition keys.	P	F
23. Determine the placement of extension links.	P	F
24. Determine NC configuration time line.	P	F
25. Determine RAU coverage and layout.	P	F
26. Review network plan and make necessary changes prior to final approval.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

FM 11-30
FM 11-37
FM 11-38

Related

FM 101-5-1
FM 11-41
TM 11-5800-216-10-1
TM 11-5800-216-10-2

PLAN AN EAC NETWORK

113-611-6111(P)

Conditions: As a plans/operations NCO in a Signal Battalion/Brigade operations center, given mission statement/commanders battle plan, user service requests, subscriber requirements analysis, signal site allocation, resource definition printouts from the Communications System Control Element (CSCE), CJCSM 6231.04 (JTS Manual for Employing Joint Tactical Communications) and maps.

Standards: The standards are met when you plan an EAC network that is approved by the S3 OIC/NCOIC to meet the requirements of the mission statement/commanders battle plan.

Performance Steps

1. Refer to CJCSM62131.04, chapter XX (Joint Transmission System Planning) dated 29 Dec 95 to familiarize yourself with EAC system planning procedures.

Evaluation Preparation: Setup: Mission statement/commanders battle plan, user service requests, subscriber requirement analysis, signal site allocation, resource definition printouts from the communication system control element (CSCE), CJCSM 6231.04 (JTS manual for employing joint tactical communication) and maps will be available. Brief soldier. You will plan an EAC network to meet the requirement of the mission statement/commanders battle plan. It must be approved by the S-3 OIC/NCOIC for you to receive a GO.

Performance Measures	Results	
1. Determine mission requirements. (Refer to the mission statement/commander's battle plan.	P	F
NOTE: The remaining performance measures are steps in the tedious process of planning a network. They do not have to be done in any order and, in a few cases, not all steps will have to be performed.		
2. Determine user/friendly forces requirements (mission statement and user service requests).	P	F
NOTE: Identify those units and personnel that are attached/detached during operation.		
3. Determine/evaluate the threat impact on mission.	P	F
a. Review intelligence reports.	P	F
b. NBC reports.	P	F
c. Enemy size/movement.	P	F
d. Any other situation that proves to be a threat.	P	F
4. Determine the availability of equipment and interoperability of sources.	P	F
5. Outline shortfalls.	P	F
NOTE: Performance measures 6 and 7 are normally performed simultaneously but may be performed separately.		
6. Allocate resources.	P	F
a. Allocate AB-1309 QEEM antenna assets.	P	F
b. Allocate SHF radio assets.	P	F
c. Allocate satellite assets.	P	F
d. Allocate TROPO assets.	P	F
e. Allocate UHF radio assets.	P	F
7. Identify overlay requirements for:	P	F
a. Plotting Army/corps boundaries.	P	F

Performance Measures	Results	
b. Plotting node centers (AN/TTC-39A, 39D, or 39D P/S).	P	F
8. Coordinate operational requirements for the following classmark database assignments.	P	F
a. AUTODIN access.	P	F
b. Commercial access.	P	F
c. Gateway for ECB access.	P	F
d. Satellite access.	P	F
9. Prioritize link activation.	P	F
10. Identify equipment for standby/reserve.	P	F
11. Determine line-of-sight (LOS) frequency plan requirements.	P	F
12. Determine VHF plan requirements for RATT/MSRT and FM net.	P	F
13. Determine internodal link requirements.	P	F
14. Determine EUB requirements.	P	F
15. Determine PAL requirements.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
CJCSM 6231.04

Related
FM 101-5-1

PLAN AN MOBILE SUBSCRIBER EQUIPMENT (MSE) NETWORK USING MOBILE SUBSCRIBER EQUIPMENT-NETWORK PLANNING TERMINAL (MSE-NPT)

113-625-2107(P)

Conditions: Given the requirement to plan the deployment of a MSE Signal Battalion/Brigade in support of a Army mission, mission statement/commander's battle plan, defined area of operation, radios to be used, available assets and unit information, frequency resources, electronic warfare threats, desired link reliability's, environmental parameters, defined planning factors, correct datum for your area of operation found on paper maps, MSE-NPT terminal with supporting software, and TB 11-5895-1544-10-1/2.

Standards: The standards are met when you have planned an ECB MSE network to meet the requirements of the mission statement/commander's battle plan and is approved by battalion/brigade S3.

Performance Steps

1. Collect and initialize data. Before using the MSE-NPT to plan a network, you must gather certain information and use that information to initialize certain databases and data files. The required information and associated MSE-NPT applications are described below.
2. a. Define Area of Operations. The network planner must define the area of operations (AOP) that will contain topographic information from the Defense Mapping Agency and map background displays from ADRG data. To create and maintain the topographic database, use Topographic Data Files (WOTL). To create an AOP and maintain the map background display database, use Map Products and Interfaces (MPI).
3. b. Define Radios to be Used. The network planner needs to know all of the MSE and non-MSE equipment that is to be used. The equipment characteristics must be current and the radio data must be on-line for the users of the MSE-NPT. To maintain the equipment characteristics database, use Equipment Characteristics. To generate the on-line radio files for use by the MSE-NPT software, use Radio/Antenna Files (DWNLOD).
4. c. Define Available Assets and Unit Information. The number of node centers (NC), large extension nodes (LEN), small extension nodes (SEN), and remote radio access units (RAU) must be determined and set using Automatic Asset Placement. In addition, you will need to specify a force laydown by name, size, type, location, and the number of mobile subscriber radiotelephone terminals (MSRT), stand alone digital subscriber voice terminals (DSVT), and digital nonsecure voice terminals (DNVT) the unit has. This information will be used to automatically place network assets at locations that will meet the unit needs. Also, you will need to use the Team Information application to specify which assets are active in the network. Only active assets will receive messages from MSE-NPT.
5. Define Frequency Resources. The frequencies available for assignment in the very high frequency (VHF), ultrahigh frequency (UHF), and superhigh frequency (SHF) bands will be required prior to generating the assignments.
6. Define Electronic Warfare Threats. Any known locations and emitter types of EW threats that can affect the assets will be required when using Net Planning - Electronic Warfare Threat Analysis.
7. Define Desired Link Reliability's. The desired path reliability's must be specified for each type of link to achieve a network with acceptable quality. The default value is 90 percent. Higher values are usually specified in more critical links, such as single thread extension links. To review examples of reliability for different types of uses and to set the desired link reliability's after establishing the link, use Net Planning - Interactive Asset Placement.

Performance Steps

8. Define Environmental Parameters. The network planner needs to set values dealing with the environment in the area of operations. These values are refractivity, ground type, background noise level, humidity, and Fresnel zone clearance. The plot units (metric or English units on plot outputs) may also be set. To set the environmental parameters, use Environmental Parameters (ENVPAR).
9. Define Planning Factors. Before placing any equipment, the planning factors concerning the nominal distances to consider between NCs, extension nodes, and remote RAUs must be established. To set the planning factors, use Automatic Asset Placement.
10. Define Datum. The calculations for coordinates used in site placement and network analyses are dependent upon the datum selected. It is important that the correct datum for your area of interest is selected before any sites or links are identified. The datum for a particular area is found on the paper maps being used for network identification.

Performance Measures

Refer to TB 11-5895-1544-10-1 and TB 11-5895-1544-10 for the following performance measures. Steps three through twelve do not have to be completed in the order shown.

Results

- | | | |
|---|---|---|
| 1. Performs MSE-NPT system power-up procedures. | P | F |
| 2. Initializes the MSE-NPT software. | P | F |
| 3. Creates a topographic data file of the mission area from a National Imagery and Mapping Agency (NIMA) source using the WOTL application. | P | F |
| 4. Creates an AOP from Map Products and Interface (MPI) application. | P | F |
| 5. Creates a subset of the equipment characteristics database using the Radio/Antenna Files (DWNLOD) application. | P | F |
| 6. Performs Automatic Asset Placement (AAP) functions to specify available assets and unit information. | P | F |
| 7. Inspects the on hand frequency list to insure the availability of appropriate frequencies to support the radios to be used during the mission. | P | F |
| 8. Queries the Battalion/Brigade/Division S-2 for known and projected Electronic Warfare Threat emitter locations within the AOP. | P | F |
| 9. Defines the desired link reliability factors as stated by the mission statement/commanders battle plan. | P | F |
| 10. Sets the default environmental parameters to be used during the mission using the ENVPAR application. | P | F |
| 11. Sets planning factors to be used for the mission using the AAP application. | P | F |
| 12. Selects the correct datum from the paper maps used for network identification and enters the information into the Datum Selection (SELDTM) application. | P | F |
| 13. S-3 OIC/NCOIC approves the planned ECB MSE network | P | F |

References**Required**

TB 11-5895-1544-10-1
TB 11-5895-1544-10-2

Related

FM 11-30
FM 11-38

**References
Required**

Related
TM 11-5895-1544-13&P

PERFORM SITE RECONNAISSANCE

113-611-1013

Conditions: For correct performance, you must have the unit OPORD/OPLAN and appropriate map(s) with areas marked to indicate equipment location.

Standards: The standards are met when the signal site is selected, stakes are marked to indicate equipment location, and the site layout and strip maps are prepared.

Performance Steps

1. Specific requirements for the signal site are contained in the mission OPORD/OPLAN. Ensure you take note of personnel, equipment, and logistics requirements when preparing for site selection.
2. Use the appropriate map to narrow the number of potential sites and routes to a list of the best possible candidate site and route(s).
3. Evaluation of potential sites must include at a minimum:
 - a. Accessibility. Can the site be reached regardless of the weather or time of year? What must travel the roads/paths? What is the condition of those roads/paths?
 - b. Terrain. Is the site relatively flat and well-drained?
 - c. Camouflage/concealment. Does the potential site provide overhead camouflage and concealment?
 - d. Technical suitability. Is the site location within the range, capabilities, and limitations of the equipment to be deployed?
4. Once the best site is selected, the site will be marked for location of tents, vehicles, generators, fuel points, and fire points. The easiest way to do this is to drive stakes at desired locations and mark them with tags to indicate what will be placed where.
5. Based on your current location, the new site and the route(s) to be taken, prepare strip maps providing adequate navigational information to permit drivers to find their way if they become separated from the main body.

Evaluation Preparation: Setup: The unit OPORD/OPLAN, appropriate maps, and transportation will be provided. Brief soldier: You will select a site, drive and mark stakes to indicate equipment locations at the site, and prepare strip maps.

Performance Measures

Results

- | | | |
|--|---|---|
| 1. Determine specific site requirements. | P | F |
| a. Logistics. | P | F |
| b. Equipment. | P | F |
| c. Personnel. | P | F |
| 2. Conduct preliminary site selection using maps. | P | F |
| 3. Determine site suitability. | P | F |
| a. Accessibility. | P | F |
| b. Relative flatness. | P | F |
| c. Natural cover/concealment. | P | F |
| d. Within equipment range. | P | F |
| e. Dependability. | P | F |
| 4. Stake equipment locations, time permitting (optional). | P | F |
| 5. Prepare strip maps to indicate route of travel to site. | P | F |

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

FM 24-1
FM 71-1
OPORD

Related

Unit SOP

Subject Area 3: Signal System/Network Engineering

**ENGINEER A MOBILE SUBSCRIBER EQUIPMENT (MSE) NETWORK USING MOBILE
SUBSCRIBER EQUIPMENT - NETWORK PLANNING TERMINAL (MSE-NPT)**

113-625-2108(P)

Conditions: As a plans/operations NCO in a Signal Battalion/Brigade Operation Center, given communication system/equipment status report, reference material, maps, mission statement/commander's battle plan, MSE-NPT and TB 11-5895-1544--10-1, TB 11-5895-1544-10-2. You are directed to engineer an MSE communications network in support of Army mission.

Standards: The standards are met when you have engineered an MSE network using the MSE-NPT to meet the requirements of the mission statement /commander's battle plan and it is approved by the S-3 OIC/NCOIC.

Performance Steps

1. Engineering the MSE network using the MSE-NPT requires you to use all of the information gathered during the planning stage and input it into the MSE-NPT mission database in seven defined steps. Those seven steps and associated MSE-NPT applications are described below.
2. Place assets
 - a. Create Force Laydown Area of Ops. Using Automatic Asset Placement, specify the area of ops where your unit will be located. Ensure that this area of ops is large enough to cover the portion of the battlefield for which you are responsible for providing communications.
 - b. Enter Unit Information. Enter the information collected about the units in the area of ops.
 - c. Specify Area Coverage. Automatic Asset Placement allows you to tailor the RAU coverage in your area of ops to provide selected areas with zero, single, double, or triple coverage. Automatic Asset Placement will adjust the placements of RAUs and NCs according to the amount of coverage specified. If no area coverage boundaries are created in the Automatic Asset Placement scenario, Automatic Asset Placement will use single coverage as the requirement for the entire area of ops.
 - d. Edit Planning Factors. Before placing the nodes and RAUs, view the factors used in the network planning of Automatic Asset Placement. Enter the constraints collected for you network during the planning stage. When placed, extension nodes that do not meet the nominal planning factors will not be connected to NCs.
 - e. Edit MSE Assets. For Automatic Asset Placement to know what assets are available for use in the network, you must enter the number of NSs, LENs, SENs (V1 and V2), and remote RAUs. Use the data collected in the planning stage.
 - f. Place Extension Nodes, NCs, and Remote RAUs. The extension nodes are allocated according to the number of wire line subscribers at a specific location. LENs will be placed at a unit location where the number of stand alone DSVTs and DNVTs exceeds the capabilities of a SEN. NCs will be placed so that each extension node can be connected to the network in such a way that the extension nodes meet the planning factor criteria. The remote RAUs are placed based on the mobile subscriber density. An area that does not have any mobile subscribers will no have RAU coverage.
 - g. Interconnect the Network. After placing the remote RAUs, you can install the "backbone" by interconnecting the network. Each NC is automatically connected to three other NCs. This option also connects the remote RAUs to a NC. At this point, the network is complete; however, link reliability's have not been analyzed.
 - h. Summary. The initial network generated by Automatic Asset Placement was based primarily on the user-defined unit and network planning factor requirements. In general, the Automatic asset Placement network will not provide reliable links throughout the network. The MSE-NPT procedures to assist in upgrading the link reliability's are discussed in the following performance steps.

Performance Steps

3. Modify site locations and links.
 - a. Site locations and links need to be modified if the link reliability is unacceptable or if sites have been placed in areas that are inaccessible. These sites should be relocated before assigning frequencies to the network.
 - b. Evaluate Link Reliability. Interactive Asset Placement (IAP) provides a path reliability evaluation of each link and a capability to manipulate the network to improve link reliability's that are initially unacceptable. If a link is critical to the network quality, its reliability requirement should be increased from the 90% default requirement. After the individual desired link reliability's have been selected, the network display will indicate link quality by the color of the link on the display. A red link is unacceptable and inoperable. An amber link is marginally reliable. A green link indicates an acceptable and operable link. Sites and links should be modified to upgrade the red and amber links to green.
 - c. Site Modification. A method of selecting candidate locations for assets that need to be relocated is to use the High Elevation Retrieval option within Network Planning - Frequency Assignment. This capability enables you to select a specified number of high elevation sites within a user -defined area. The high elevation sites will usually provide improved link performance for the sites selected by Automatic Asset Placement. If any RAU sites are modified or added, Interactive Asset Placement should be used to evaluate the reliability of these added or modified links.
 - d. Antenna Height Modifications. One method of improving link reliability is the modification of antenna heights at the site. However, link degradation may occur from increased antenna heights.
4. Evaluate RAU coverage
 - a. The RAU Siting Option of Network Planning - Frequency Assignment should be used to plot radio coverage of local and remote RAUs and to perform propagation analyses.
 - b. Automatic Asset Placement can also be used to site and adjust the placement of RAUs on a map background according to zero, single, double, and triple coverage requirements. This coverage is based solely on the planning range of the RAU and not on a propagation analysis, as is performed in the RAU Siting option mentioned above.
 - c. If the RAU plot shows areas that are not covered by a RAU, you can move one or more RAUs while in the RAU siting option by selecting a RAU and entering new coordinates. You also have the ability to add a new RAU. Once the RAUs are positioned to provide the required coverage, you can save the new coordinated to an exercise.
 - d. If any RAU sites are modified or added, Interactive Asset Placement should be used to evaluate the reliability of the added or modified RAU-to-node links.
5. Assign frequencies
 - a. Assign UHF and SHF. UHF and SHF are assigned for the network links through use of Network Planning - Frequency Assignment. Before assigning frequencies, you must select the list of frequencies available for assignment and the appropriate sets of criteria for the radios in exercise.
 - b. Select Frequency Lists and Selection Criteria. Create one or more frequency list(s) that contains all of the available frequencies for the exercise. Frequencies must be specified for each radio type in the exercise. In addition, a primary criteria list will be required for each radio type in the exercise. Each radio type also may have a secondary and a tertiary criteria list. These criteria lists should be progressively more lenient. The tertiary list should contain the most relaxed restrictions. If MSE-NPT cannot assign frequencies to all the links based on the primary criteria, it will try using the secondary and tertiary criteria.
 - c. Perform Frequency Assignment. Select the frequency assignment option of MSE-NPT and the method of assignment. If MSE-NPT is unable to assign frequencies to all the links, you must either relax the selection criteria or select a different method of assignment. After the frequencies are assigned, the link reliability is re-evaluated using IAP.

Performance Steps

- d. Assign VHF. VHF assignments are recommended for MSRTs and RAUs through the use of VHF Planning and Management. You may create your own frequency resource or you may load a resource via floppy disk. Once a frequency resource has been generated, you can specify the number of pairs to be assigned and the assignment strategy. A list of frequency pairs will be generated to create a VHF plan. You may also manually enter a frequency plan. VHF plans are then distributed to the RAU GLUs and activated at the appropriate time.
6. Analyze Electronic Warfare (EW) Threat. After the frequencies have been assigned to the network, you may then determine the effect of any known threat emitters
 - a. Create and Position EW Threat Platforms. You may create and position an EW threat platform element by entering the characteristics of the jammer elements. It will be necessary to refer to the appropriate threat documentation to obtain the jammer characteristics. In a tactical environment, coordination with military intelligence will be necessary to enable you to define the position and emitter type of the jammer.
 - b. Display EW Effects. Use the option to display the effects of EW threats on your network. If link reliability's degrade to unacceptable, the sites and/or links will need to be modified.
 - c. Respond to EW Threats. Once the effects of EW Threats have been determined and displayed, Net Planning - Network Connectivity Optimization can be used to suggest site locations that will provide upgraded link performance.
7. Reassign Frequencies. The MSE-NPT frequency assignment algorithm is dependent on the network geometry. Therefore, after site and/or link modification have been incorporated, the network frequencies must be reassigned by using Network Planning - Frequency Assignment

Evaluation Preparation: Setup: Communications system/equipment stunts report, reference materials, mission statement/commanders battle plan, and maps will be available. Brief soldier: You will engineer an MSE network using the MSE-NPT to meet the requirement of the mission statement/commander's battle plan. it must be approved by the S-3 OIC-NCOIC for you to receive a Go.

Performance Measures**Results**

1. Performs MSE-NPT system power-up procedures	P	F
2. Initializes the MSE-NPT software	P	F
3. Places assets	P	F
a. Creates force laydown area of ops.	P	F
b. Enters unit information	P	F
c. Specifies area coverage	P	F
d. Edits unit information.	P	F
e. Edits MSE assets	P	F
f. Places extension nodes	P	F
g. Interconnects the network.	P	F
4. Modifies site locations and links.	P	F
a. Evaluates link reliability.	P	F
b. Performs site modification as required	P	F
c. Implements antenna height modifications as required	P	F
5. Evaluates RAU coverage	P	F
a. Performs propagation analyses to plot radio coverage of local and remote RAUs.	P	F
b. Adjusts RAU locations as required.	P	F
c. Evaluates the reliability of added or modified RAU-to-node links.	P	F
6. Assigns frequencies.	P	F
a. Assigns UHF and SHF frequencies	P	F

Performance Measures**Results**

b. Selects frequency lists and selection criteria	P	F
c. Performs frequency assignment	P	F
d. Assigns VHF frequencies.	P	F
7. Analyzes EW Threat	P	F
a. Positions the EW Threat platform	P	F
b. Displays EW effects	P	F
c. Responds to EW Threat	P	F
8. Reassigns frequencies as required.	P	F
9. S-3 OIC/NCOIC approves the planned ECB MSE network	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step show what was done wrong and how to do it correctly.

References**Required**

FM 11-30

FM 11-38

Related

TB 11-5895-1544-10-1

TB 11-5895-1544-10-2

ENGINEER AN ECB NETWORK USING THE SCC

113-625-2077(P)

Conditions: Given an requirement to engineer an ECB network, you will need the mission statement/commander's battle plan, predeployment software support (PDSS) for corp/division, team screens and printouts from system control center (SCC), high point search profile from SCC, user request for service, maps, project worksheets, TM 11-5800-216-10-1, and TM 11-5800-216-10-2.

Standards: The standards are met when you have engineered an ECB network to meet the requirements of your unit mission statement/commander's battle plan and is approved by the S-3 OIC/NCIOIC.

Performance Steps

1. ECB is the command and control communication system for corps and below. The area coverage function provides a secure, automatic, digital network to enable access from anywhere within the corps area of operations, by subscribers of both the mobile subscriber access and wire subscriber access areas. Area coverage is provided by equipment which processes, routes, and extends subscriber calls throughout the MSE system. The area coverage function also utilizes integrated internodal trunking, radio access to mobile and wire subscriber access functions, communications security (COMSEC), system control, interfaces with other elements of the MSE system to process and route secure voice and data, and facsimile communications between subscribers. This functional area provides the tandem switched network function. It provides flood search routing within the system and interfaces with non-MSE networks, such as EAC. Area coverage includes a network of node centers (NC) each consisting of a net control station (NCS), radio access unit (RAU), line-of-sight (LOS) terminals, node management facility (NMF), and NSV. The large extension nodes (LEN) and small extension nodes (SEN) contain the LENS and the SENS. They provide wire subscribers at the various CPs access to the MSE network. The LEN and SEN are commonly referred to as the subsystems that provide wire subscriber access. The RAU is the subsystem that permits the mobile subscribers access to the MSE network.
2. OPORD.
 - a. At the end of the planning phase, the OPORD is produced and distributed. The SCC with its automated capabilities can greatly increase the efficiency of this process. For example, each successful LOS path profiling project that was completed during the planning phase can be printed and distributed to units responsible for installation.
 - b. Plan a schedule of events so the command knows exactly what is expected. Include the following items in the schedule.
 - (1) A concept briefing to commanders and staff.
 - (2) A technical control meeting with platoon leaders, platoon sergeants, and switch supervisors. (This meeting should cover how to perform MSE and non-MSE interfaces.)
 - (3) A back brief to brigade/battalion operations.
 - (4) A final OPORD briefing to commanders, staff, and NC leadership. (Issue the OPORD at this time.)
 - (5) The final team packets are issued to battalions for distribution to teams.
 - c. The five paragraph format of the OPORD is still used. The following key points are mandatory when publishing MSE plans or annexes.
 - (1) Edition of database tapes.
 - (2) COMSEC key distribution.
 - (3) Number of RAU/MSRT frequency plans and designation of the active plan.
 - (4) Locations, distribution, loading, and priorities for PALs.
 - (5) Gateway area codes.
 - (6) Priority of RAU coverage (where RAUs should provide coverage).
 - (7) SCC locations.
3. Installing the backbone.

Performance Steps

- a. In the MSE operation, establishing and sustaining the backbone network (NC-to-NC link) is the most critical element. The objective is for a strong multilink system that allows the direct bulk transfer of the key sets to all node switches/large extension node switches (NSA ENS) and RAU/MSRT frequency plans to all RAUs. Ensuring that a strong backbone is established before allowing subscriber connectivity alleviates work-around due to switch software, hardware, or COMSEC problems. This is also true for loading the PAL. All network managers, NS supervisors, and node OICs must remember that a PAL is loaded only once. Network managers must designate which NS loads the PALs and keeps track of PALs when they are loaded.
- b. Once deployed, OICs follow OPORD procedures for priority of backbone LOS connectivity. All radio links may be worked at the same time; duplication and bypass follow the link priority list. At this stage, node OICs inform the system control center/system control (SCC/SYSCON) of their NCs operation, including messages back to the SCC. All NSs/LENs must keep the duplication and bypass assignment printed and current. This information is vital when nodal links fail, or as NCs move throughout the network, or when redirection of duplication and bypass occur.
 - (1) As the first backbone link is established (DTG status 13 and TSB 5), the NS operator verifies link status. He uses the display interswitch link (DIL) screen before preparing to send duplication and bypass to another NS. This ensures the link is initialized and a transmission status of 2 is established. Any other status is unacceptable.
 - (2) Once established, each NS duplicates all virtual trunk groups (32-40) and TGCs over the first backbone link. The exceptions are TGCs 1 through 6, unless downsized for a SEN/RAU. As the NSs continue to follow their priority list and the second backbone link is established, the NS operator deletes all odd-numbered TGCs and odd virtuals from the first nodal link and duplicates them over the second nodal link.
 - (3) When the duplication and bypass process is complete and the backbone is operational, the NS operator performs bulk transfer of COMSEC keys. To establish a COMSEC error-free network, the bulk transfer of a master key set is sent directly into the correct HUS locations from the leader switch to the subordinate NSs in that NSG.

4. Planning guidelines.

NOTE: The mission and unit SOP will determine specific planning guidelines.

- a. The general planning guidelines for the MSE system are basically the same as for any communications system.
- b. The following represents a general planning list:
 - (1) Identify OPLAN requirements.
 - (2) Review the mission and user request.
 - (3) Determine equipment availability/interoperability.
 - (4) Obtain equipment condition status.
 - (5) Allocate resources based upon availability and OPLAN mission.
 - (6) Outline shortfalls.
 - (7) Engineer network and link-up with other networks.
 - (8) Allocate capabilities.
 - (a) DCO access.
 - (b) Precedence.
 - (c) Security classmarks.
 - (9) Identify network management (active, Reserve SCC).
 - (10) Determine restoral capability (uncommitted equipment).
 - (11) Prepare emergency plans (EUB and duplication list).
 - (12) Prepare database.
 - (13) Position redundant (spare) equipment at key positions.
 - (14) Plan and coordinate COMSEC generation distribution.
 - (15) Get tactical satellite (TACSAT) time.
 - (16) Conduct planning conferences.
 - (a) Nodal.

Performance Steps

- (b) Divisional.
 - (c) Corps.
 - (d) ECB.
 - (e) Task force.
 - (f) Commercial.
 - (g) TACSAT.
5. Planning process.
- a. Review the tactical situation and the commander's guidance/intent.
 - b. Develop an overlay containing the corps and division boundaries and unit location down to brigade level including any separate battalions (as needed) that require communications support. Annotate the overlay with the number of MSRTs and wire line subscribers that require support by SOP or doctrine.
 - c. Once you have completed plotting the general areas of usage for the MSRTs and the more specific locations of the wire line subscribers, the next step is to choose your RAU locations. Using the high point data, pick the locations that will provide the best coverage, ensuring that all possible areas in the corps/division are covered and that high density MSRT areas (over 25) are covered by more than one RAU. Before laying out your RAUs, check the adjacent divisions and the corps RAU locations to determine the extent their RAU coverage overlaps into your area.
 - d. Determine extension node locations based on the density of wire line subscribers and location of supported CPs.
 - e. Determine the NC locations by looking at the proposed RAU locations to determine which of them would also support our extension nodes with LOS connectivity. NC site selection is based largely on the LOS radio links required to tie in extension nodes and the remote RAUs to the backbone network. The locations may have to be adjusted to ensure LOS is available. Connect the NCs to the extension nodes and remote RAU locations, ensuring each LOS system is feasible. (The SCC signal path profiling feature allows you to calculate the probability of establishing an LOS shot between any two points on your map.) If there are any areas not covered, mark them for net radio interface (NRI) service and place your NRIs to fill the gaps.
6. Automated frequency management for MSE assets is performed at each SCC work station assigned to appropriate function. The SCC automatically engineers and assigns LOS frequencies for internodal, extension, and SHF radio links used in the MSE system. The selection of the band to be used for a specific UHF or SHF radio link is made by a network planner and provided to the SCC operator, based on the availability of UHF/SHF equipment. The corps SCC also generates RAU/MSRT frequency plans. Upon approval, the plans are transmitted to the GLU of all connected RAUs. These RAU/MSRT frequency plans are used by all the RAUs and MSRTs of the MSE network.
7. Prepositioned COMSEC keys are required at the NC/LEN, SEN, RAU, and each MSRT subscriber until a contiguous network is formed and the SCC can perform a rekey operation. To prepare for COMSEC rekeying, the signal orders must specify the primary and secondary NC as well as the COMSEC leaders/followers to establish responsibility for key distribution during the key cycle.
- a. The planner must ensure the brigade network technician distributes the prepositioned key set to the battalion network technicians. MSE will not work unless the correct keys are in the correct places in all equipment. Planners must coordinate with adjacent corps and EAC for gateway keys before deployment. A sound key management plan must be understood and practiced by all operators and taught to all subscribers.
 - b. Issue prepositioned keys LAW COMSEC to teams on the day of deployment in the staging area. The ACSO/ADSO coordinates COMSEC key distribution to all corps and division MSRT users.

Performance Steps

- c. COMSEC accountability must be maintained for all keys distributed to each element in the network. Prepositioned COMSEC keys at specified locations ensure the switches and users have the respective keys needed to operate the specific pieces of equipment such as switches, MSRTs, and RAUs. The accountability process provides the feedback required to accurately determine where keys are located throughout the network. COMSEC manager worksheets are designed to help network managers plan and conduct orderly distribution of COMSEC keys to MSE teams. Completed worksheets also provide an accounting record for initial key distribution.
8. EUB. If an NCS or LENS processor fails, MSE EUB function electronically bypasses the failed switch and transfers essential user access trunk groups directly connected to an NCS or LENS to an adjacent NCS. This feature provides virtually no interruption in essential user service during a processor failure because all essential users are reaffiliated at the adjacent NC. A minimal loss of service will occur during the time the subscribers are affiliated with the parent NCS or LENS that has been returned to service.
9. Project worksheets.
- a. The system manager worksheet (deployment) shows the information a system manager derives from a paper map. This worksheet, when completed, is given to an SCC operator for entry into the database. The planning guide given at the bottom of the worksheet shows the maximum number of projects that need to be created for the movement of an operational team (NC, LEN, SEN, remote RAU).
 - b. LEN movement. The critical information required for planning this action indicates the link and site shutdown times, the time of LEN arrival at the new site, and the type of communication links that need to be planned. After the situation is reviewed for COMSEC requirements, the worksheet is returned to the system manager for approval and the given to the operator for execution. When all projects are complete, the operator annotates the generated messages in the remarks column and returns the worksheet to the system manager.
 - c. NC movement. The primary goal of the system manager worksheet is to resolve the links disturbed by movement of the NC. Though an NC probably has few active links before movement, most links will have been previously transferred to avoid interruption of service. If an associated SEN moves itself during, or immediately prior to, any movement of the NC, it can be considered an activity independent of the NC movement and not a disturbance caused by the movement of the NC.
 - d. Borrowing/loaning SENs. In the event of an SEN associating with an NC that is not from its parent battalion, worksheets from the lending and borrowing NCs are completed. A COMSEC worksheet is completed, if required. These become part of the packets for both SCCs. The action begins with a phone conversation between the two S3/SCCs. This resolves questions of why the borrowing is needed, what administrative and logistics details are involved, and what time constraints exist. After this conversation, the system managers at both SCCs fill out their respective worksheets. When the SEN is to be returned to its parent battalion, another set of these worksheets is completed, even if the SEN only goes into reserve status, since it must be dropped from the borrowing battalion and reassigned to its parent battalion.
 - e. RAU activation. The SCC system manager completes the following requirements to activate an RAU that has been in reserve status:
 - ↳ Order RAU to a site.
 - ↳ Establish link with a node.
 - ↳ Perform COMSEC transfer.
 - ↳ Load frequency plan.
 Complete the first two of these requirements on the same worksheet. Complete the second two of these requirements on separate worksheets.
 - f. The system manager worksheet shows the information required to add or delete subscriber directory numbers, activate switch PALs, and change subscriber profile numbers.
10. RAU coverage and layout.
- a. The RAU (AN/TRC-191) provides network access to mobile radiotelephone subscribers. The RAU can be deployed adjacent to an NC (local) or can be remotely by means of the LOS radio (AN/TRC-190(V)1).

Performance Steps

- b. The mobile subscriber gains network access through the RAU. The signal planner deploys RAUs to provide battlefield coverage. One RAU can provide a 15-kilometer (9.3-mile) radius area coverage (planning range) in the area of operations. Following initial affiliation, mobile subscriber affiliation is maintained automatically as it moves from one RAUs range to another. If the mobile subscriber is engaged in a telephone conversation and leaves the servicing RAUs range, the conversation is terminated and must be redialed.
- c. The RT-1539(P)/G MSRT radio and the RAU radio are identical and interchangeable. In the MSRT or RAU, the radio operates in a full-duplex mode with a high and low frequency band for transmit and receive channels. In the RAU, the radio transmits in the high band and receives in the low band. This procedure is reversed when the radio is used in the MSRT configuration.
- d. The RAUs are generally used in a local (collocated with an NS) and remote arrangement. This does not mean that both RAUs cannot be remoted. This depends on the availability of an LOS assemblage to support it. Those RAUs closest to the FEBA use emitter masking techniques because the RAU constantly emits a marker beacon declaring its availability to affiliated MSRTs. With this in mind, the node platoon leader/sergeant must make important tactical deployment decision about SIGSEC.

11. Placement of extension links.

- a. The LENS provides local switching and network access for up to 164 digital subscribers. An LEN provides service for large concentrations of users, such as COSCOM/DISCOM or corps/division main. The LEN consists of an OG shelter and an SG shelter. The AN/TRC-190(V)4 LOS radio provides network connectivity.
- b. The SENS provides local switching and network access for 26 subscribers (AN/TTC-48(V)1) or 41 subscribers (AN/TCC-48(V)2). A habitual relationship may be established and maintained between extension nodes, including LOS teams and the division CP. The same relationship may be established with corps combat unit CPs (ACRs, artillery brigades, or ADA brigades). While a habitual relationship may be desired for tactical familiarity and ease in support, MSE extension nodes do not revert to a reserve role when the supported CP/unit assumes a reserve role. In these situations, MSE extension nodes are assigned a revised support role. Habitual relationships may be reestablished when the affected elements return to an active role. In the corps area of operations, essential C2 facilities (division main, corps main, corps rear, and tactical CPs) should be provided dual LOS network connectivity. This entails assigning additional and redundant extension facilities (SENS/LENs).

12. Operational readiness/internodal link requirements.

- a. An NC is considered operational when one NCS-to-LOS radio link to another LOS-to-NCS is completed, four extension nodes and remote RAUs are ready (interconnected to the switch, antenna erected and aligned, multichannel radio on and tuned), the node processors and related equipment are ready to process traffic, and the local RAU is connected and ready to accept affiliation calls from terminals. An LEN or SEN is considered operational when at least one access LOS link, cable link, or SHF radio link is ready and the node processors and other common equipment are ready to accept traffic from wire subscribers.
- b. Setup time for an NCS begins when the LOS and RAU shelters arrive on a properly leveled and cleared site. Setup time for an LEN begins when the shelters arrive on a properly leveled and cleared site and all required subscriber RMCs and junction boxes are preinstalled and connected to the LENS.

NOTE: The times listed are only for 9-meter and 15-meter mast installations. Use of the 30-meter mast is not considered a typical or normal deployment.

- c. Teardown time for the NCS begins when the last internode LOS link is disconnected. The system is considered unavailable after a maximum time of 10 minutes during switchover/reaffiliation.

13. Ring code management considerations.

Performance Steps

- a. The battalion SOI must reflect the basic ring tone/channel assignments. Any conflicting or duplicating ring codes that affect the operation of the digital voice orderwire (DVOW) system must be referred to the corps or division SCC which controls that link. The corps or division SCC must keep an up-to-date diagram of ring tone assignments for all links and coordinate closely with other SCCs on cross boundary links.
- b. Due to the inability of the NS DVOW to serve all possible DVOW connections, the node platoon leader will decide on priority users for connectivity to the DVOW system. The node platoon leader must ensure engineering communications are passed by other means to the shelters which do not have the DVOW. Digital nonsecure voice terminal (DNVT) may be connected through the 24 local loops and used for this propose.
- c. All NMFs must keep local diagrams showing all ring tone assignments and changes to channel connections due to faults.

Performance Measures**Results**

1. Prepare system/network backbone diagram. (Refer to mission statement/commanders battle plan.	P	F
2. Prepare map overlays.	P	F
a. Plot corps/division boundaries.	P	F
b. Plot site (NC, LENS, SENS, RAU/MSRT, LOS, and so forth).	P	F
c. Plot internodal link requirements.	P	F
d. Plot the placement of extension links, to include with and without DTH requirements.	P	F
e. Plot RAU/MSRT coverage and layout.	P	F
3. Prepare an NC configuration time line.	P	F
4. Prepare a bypass and duplication requirements list.	P	F
5. Prepare an EUB requirements list.	P	F
6. Prepare a COMSEC key distribution/control and procedures checklist to include the following:	P	F
a. Prepositioning COMSEC key requirements.	P	F
b. COMSEC bulk transfer requirements and procedures.	P	F
7. Prepare the network requirements for combat net radio (CNR), commercial access, tropospheric scatter (TROPO), TACSAT, non-MSE, and gateway interfaces.	P	F
8. Prepare project/assignment worksheets for the AN/TQY-46(V).	P	F
a. General information.	P	F
b. Link data status.	P	F
c. Equipment status.	P	F
d. Personnel status.	P	F
9. Prepare an order message designating corps/division boundaries.	P	F
10. Prepare an order message to request LOS frequency plan.	P	F
11. Prepare an order message to request VHF plan.	P	F
12. Prepare an order message to change/modify the NS database.	P	F
13. Prepare an order message to change/modify the LENS database.	P	F
14. Prepare subscriber classmarks/profile/assignment.	P	F

Performance Measures

Results

15. Review the network plan and make necessary changes prior to final approval.

P F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

TM 11-5800-216-10-1
TM 11-5800-216-10-2

Related

FM 101-5-1
FM 11-30
FM 11-37
FM 11-38
FM 11-41

ENGINEER AN EAC NETWORK

113-613-5006(P)

Conditions: Given the task to engineer an EAC network, mission statement/commander's battle plan, user service requests, subscriber analysis, signal site allocation, resource definition printouts from the Communication System Control Element (CSCE), and paper maps of the area of operation.

Standards: The standards are met when you engineer an EAC network to meet the requirements of the mission statement /commander's battle plan and is approved by the S-3 OIC/NCOIC.

Performance Steps

1. Engineering an EAC interface link refers to any nonstandard MSE link with any switching system or through any transmission means that requires modification of the standard MSE database. Interface links include use of tactical satellite (TACSAT) as a transmission means, use of AN/TRC-170 tropospheric scatter (TROPO) radio, interface with an AN/TTC-39 at EAC, use of the switching facilities of an AN/TYC-39 message switch, interface with NATO allies with the NAI, use of all source analysis system (ASAS) and tactical fire (TACFIRE) direction system, and connection to an adjacent MSE-equipped corps. Since none of these capabilities are part of the standard node center (NS) or large extension node (LEN) database, careful planning is required to ensure all database modifications and equipment adjustments are accomplished. Data rates, channel rates, number of channels, signalling format, transmission means, and numbering plans must all be resolved for any specific interface to work.
2. Responsibilities.
 - a. The Brigade/Battalion S-3 OIC/NCOIC will identify requirements to interface TRI-TAC equipment with MSE and non-MSE systems and equipment and coordinate required interfaces.
 - b. The Brigade/Battalion CSCE (SYSCON/BATCON) will plan and engineer all interfaces of EAC with MSE and non-MSE systems and equipment, develop standard procedures for implementing TRI-TAC to MSE and non-MSE interfaces, and provide the Node Switch (NS) or LEN making the interface with the information required to modify the database.
 - c. Node management is responsible for implementing required database modifications with information provided by the CSCE (SYSCON/BATCON), organizing equipment resources to meet interface requirements, and making final coordination with the distant end..
3. Critical planning factors.
 - a. Link type (TACSAT, TROPO, UHF, SHF, CABLE, or EAC-to MSE Gateways).
 - b. Location and grid coordinates of sites, switches, and terminals.
 - c. Transmission equipment type (identify radio equipment used and its associated modems or multiplexers)
 - d. Frequency bands for radio equipment.
 - e. Transmit (XMIT) and receive (RCVR) frequencies/azimuth/polarization
 - f. Switching equipment in link (TTC-39A, TTC-39A(V)4, TTC-39D, and TTC-39D P/S).
 - g. Cable signal format (dipulse or diphas).
 - h. Timing. Assign necessary master/slave timing relationships. The TTC-39s and LENS have a very stable atomic timing source and should normally be designated as master for timing source when master/slave
 - i. Foreign area code. YX+NYX code assigned to EAC, NATO, or adjacent MSE corps where 9YX is the country code (914 for US) and NYX is the area code. For the US, each corps and EAC has a different area code.
 - j. Home area code. The NYX for III Corps is 714.
 - k. Trunk encryption key. Includes key tag number, equipment (KG-194 and so forth), and coordinating instructions for key generation and distribution.
 - l. Area interswitch rekey variable (AIRV). Used to encrypt the transfer of the per call key between MSE and adjacent corps MSE and EAC.
 - m. Message switch rekey variable (MSRV) and message switch net variable (MSNV). Used for encryption between NCS/LEN and AN/TYC-39 message switch.

Performance Steps

n. Dialing instructions and from corps to EAC or NATO.

4. MSE interoperability with EAC and non-MSE communications interfaces.

- a. In the MSE network, access for analog communications is provided by the following:
 - (1) The tri-service tactical communications (TRI-TAC) network provides NATO, defense switching network (DSN), and commercial office access at EAC.
 - (2) At ECB, MSE communications will interface through an node switch (NS) for NATO via an NAI.
 - (3) DSN and commercial office access is provided through a LENS or small extension node switch (SENS) via single frequency and direct closure line interface.
 - (4) Army tactical communications system (ATACS) analog switches will normally access MSE through the TRI-TAC network.
 - (5) Calls to EAC are routed via flood search until a gateway NS is found that has a DTG interfacing with TRI-TAC. The NS then routes the calls deterministically through the interfacing DTG to the TRI-TAC network as if the NS were a TRI-TAC switch.
 - (6) Direct dialing is possible using area codes. Calls between corps, to DSN and NATO, or commercial offices are identified by area codes and routed to the required gateway (MSE, TRI-TAC) regardless of which numbering plan is used. Each switch must be programmed by the switch personnel for its home area code. The NS gateway to TRI-TAC will also have the corps area code for the interfacing DTG. The TRI-TAC switch will be programmed in the same way for the MSE NS gateway access into the corps network.
 - (7) Calls routed through some gateways have the potential of call completion delays.
- b. Interoperability considerations for EAC-to-ECB interface. Technical parameters must be coordinated prior to deployment.
- c. Equipment setup for NS-to-EAC.
 - (1) The CX-11230/G is issued in 1/4 mile reels. The reels of cable can be combined to accommodate distances of 1/2, 1/4, 3/4, and 1 mile. The following tables have three entries for the CX-11230/G cable: cable reels, cable transmit, and cable receive. Cable reels give the number of reels used (1, 2, 3, or 4). Cable transmit and cable receive give the corresponding entries for the number of cable reels used.

NOTE: In the following tables, "1m" means 1 mile; "NA" means not applicable; and "No Adj" means no adjustment.

- (2) Table 3-1 lists the cable adjustment settings for the NS-to-EAC via the AN/TRC-151.
- (3) Table 3-2 lists the cable adjustments settings for the NS-to-EAC via the AN/TRC-170.
- (4) Table 3-3 lists the cable adjustment settings for the NS-to-EAC via the AN/TRC-173/174.
- (5) Table 3-4 lists the cable adjustment settings for the NS-to-EAC via the AN/TSC-85A/93A (using TD-1337 TRI-TAC port).
- (6) Table 3-5 lists the cable adjustment settings for the NS-to-NS via the AN/TSC-86A/93A (using TD-1337 TRI-TAC port).

5. TRI-TAC/EAC communications.

- a. It is essential that EAC tactical communications systems provide capabilities similar to the MSE corps and division area system. The need for increased flexibility, dispersability, mobility, and transportability at EAC agrees with the airland battle concept of a deeper, expanded, and integrated battlefield. Bringing MSE capabilities into EAC satisfies user mobility requirements and eliminates artificial communications boundaries between corps and EAC. However, there still remains a need for greater geographical communications coverage and an increased capability for supported units to disperse throughout the EAC area of operation. This establishes the need for many automatic switching nodes. Greater dispersion of support units can be achieved and greater reliability and survivability of network traffic provided with the increased number of transmission paths and switching centers.

Performance Steps

- b. Operational characteristics. The TRI-TAC communications architecture is a digital, automatic, common-user switching network that provides mobile subscriber capabilities identical to corps and division capabilities. TRI-TAC and MSE programs provide material resources for implementing required operational capabilities. The block III structure consists of TRI-TAC block III heavy battalions (digital group multiplexer [DGM] based) and block III light battalions (MSE based). The TRI-TAC block III system will provide the following:
 - (1) MSE compatible nodal circuit switching, including flood search routing, automatic subscriber affiliation, and MSRT subsystem features. This is done by modifying the AN/TCC-39A TRI-TAC circuit switch to an AN/TTC-39D.
 - (2) Automated network control features.
 - (3) Unit level extension switches.
 - (4) Internodal and intranodal radio transmission.
 - (5) Net radio interface (NRI) capabilities.
 - (6) Formal/information record traffic service on dial up basis.
- 6. DGM and MSE characteristics.
 - a. There are five DGM assemblages--Radio terminal set AN/TRC-170. Radio terminal set AN/TRC-173. Radio repeater set AN/TRC-174. Radio terminal set AN/TRC-175. Radio repeater set AN/TRC-138A.
 - b. These DGM assemblages are used in the TRI-TAC system. The DGM assemblages provide secure high capacity digital transmission facilities. There are 4 to more than 500 16 kb/s to 32 kb/s channels available by multiplexing loops into super groups, and by combining super groups into master groups. Transmission between sites can be by radio or cable.
 - c. The DGM assemblages Operate 24 hours a day under battlefield conditions. Operate with local or remote power sources. Satisfy tactical transportability and mobility requirements. Provide ECCM protection. Operate in different climates. Provide encrypted and unencrypted voice, data, and record traffic communications. Can be set up and torn down quickly.
- 7. Radio terminal set AN/TRC-170. The AN/TRC-170(V) family of tactical TROPO radio terminals provides digital trunking between major nodes. The terminals are identified as AN/TRC-170(V)2 and AN/TRC-170(V)3. The AN/TRC-170(V)2 can operate quad diversity, while the AN/TRC-170(V)3 can operate dual diversity. They can be configured in either a line-of-sight (LOS) or TROPO mode of propagation. Radio frequency (RF) operation is in the 4.4 to 5.0 GHz frequency range with either a 3.6 MHz or 7.0 MHz bandwidth. Transmitted data rates may be 128, 144, 256, 288, 512, 576, 1024, 1152, 1536, 2048, 2304, 4096, and 4608 kb/s. (The actual transmitted "mission" rate is slightly higher than these rates due to the overhead bits added in the TROPO modem.) The AN/TRC-170 uses a distortion adaptive receiver (DAR) modem. The DAR modem is employed to counter propagation dispersion and permit high data rate transmission. Space diversity antennas are used with both the AN/TRC-170(V)2 and AN/TRC-170(V)3.
- 8. Radio terminal set AN/TRC-173 provides radio termination and multiplexing for extension assess links of 8 to 36 total channels at 32 kb/s per channel. This provides 7 to 32 traffic channels. A maximum of 64 traffic channels can be provided at 16 kb/s per channel. The AN/TRC-173 provides direct interface with any mixture of 4-wire analog and digital subscriber terminals using RMCs/remote loop group multiplexers (RLGMs). It is also used to directly interface with ULCSs.

Performance Steps

9. Radio repeater set AN/TRC-174 is employed in extension links up to 30 miles (48 kilometers) to provide entry to users within the vicinity into the area communications systems. It is used as a split terminal at major areas and extension nodes to provide radio termination of up to three systems of 8 to 32 kb/s per channel. It is also used as a radio repeater to extend the range of extension links. The AN/TRC-174 is used with the AN/TRC-138 at the node or with the large or small extension switch at extension nodes for split terminal applications. The AN/TRC-174 does not have a trunk encryption capability. All trunk groups must first be encrypted at the extension switch or AN/TRC-173 before transmission over a radio link employing the AN/TRC-174. The AN/TRC-174 may also be used to terminate low speed cable systems. These systems may be extended to a maximum of 40 miles (64 kilometers) by inserting pulse code restorers at 1-mile (1.6-kilometer) intervals. The AN/TRC-174 can provide an interface between the AN/TRC-138A and ATACS and can improve the ATACS.
10. Radio terminal set AN/TRC-175 is employed at the bottom-of-hill (BOH) area communications node to provide a short range wideband radio system (SRWBR) link up to 5 miles (8 kilometers), with the radio repeater set AN/TRC-138A located at the top-of-hill (TOH) radio park. This link is used for the transmission of a master group of up to 576 total channels at 32 kb/s or 1,152 channels at 16 kb/s. If the AN/TRC-175 is inoperative, an AN/TRC-138A is used to provide backup for the SRWBR link. High speed pulse restorers are placed at 1/4-mile (0.4-kilometer) intervals. The AN/TRC-175 can be used to establish SRWBR or cable links with two radio hills (split radio hill operations) in situations where there is insufficient area on one hill for all the assemblages or there is no single clear LOS path to all remote locations.
11. Radio repeater set AN/TRC-138A is employed to provide up to 1,444 channels over a microwave link with adjacent nodes and for SRWBRs and high speed cable links between the BOH area communications node and the TOH radio park. It is used as a radio/cable terminal to terminate up to three systems or as a radio repeater to extend the range of internodal multichannel links. The AN/TRC-138A is used in both pulse code modulation (PCM) (12 to 96 channels) and DGM (36 to 144 channels) multichannel systems to satisfy operational requirements. This assemblage is the focal point of the radio park and has the responsibility of distributing the radio multichannel entering or exiting the radio park. Additionally, the AN/TRC-138A is used to provide distribution and consolidation of equipment orderwire circuits between the BOH area communications node and the TOH radio park multichannel assemblages.
12. The TACSAT communications of the US Army ground forces operate in one of four categories. For purposes of planning, the Army version will be the only one mentioned. The terminals for the Army multichannel satellite communications system are the AN/TSC-85B and AN/TSC-93B. The Air Force terminals are the AN/TSC-94A and the AN/TSC-100A. The satellites used for interconnectivity of these multichannel terminals are defense satellite communications system (DSCS) IIs and DSCS IIIs. The frequency range of this system is SHF (7.9 to 8.4 GHz for uplink and 7.25 to 7.75 GHz for downlink).
 - a. Multichannel SHF system.
 - (1) Multichannel TACSAT terminals provide a reliable communications system. These terminals provide range extension for the area communications system.
 - (2) The multichannel TACSAT systems are compatible with TRI-TAC and MSE systems. The TSC-85B TACSAT terminal (nodal terminal) provides the following: transmission of a single SHF uplink carrier with up to 48 channels of voice and/or digital data (internally multiplexed). An additional 48 channels of voice and/or digital data from a remote (externally multiplexed) source may also be transmitted.
 - b. Division.
 - (1) The division receiving multichannel TACSAT terminals are selected based on their operational areas, terrain, and distance considerations. The signal battalion installs, operates, and maintains the AN/TSC-85B/93B.

Performance Steps

- (2) In selected divisions, five multichannel TACSAT terminals provide extended distance connectivity. Division main and DISCOM use one AN/TSC-85B each. One AN/TSC-93B is deployed to each of the three maneuver brigades. This is at the commander's discretion. An AN/TSC-85B at division main might terminate links from each maneuver brigade and DISCOM. During division main displacements, the terminal at DISCOM acts as the hub.
 - c. In the corps, two AN/TSC-85B and four AN/TSC-93B are pooled to provide support based on the general support (GS) concept. Terminals in support of corps are used for various missions such as restoration of critical links, out-of-sector operations, and deep operations. This concept has been developed based on the range extension capability of the MSE system. The corps signal brigade installs, operates, and maintains the AN/TSC-85B/93B.
 - d. Contingency corps.
 - (1) AN/TSC-85B/93B are distributed to the contingency corps based on their mission. The corps signal brigade installs, operates, and maintains the AN/TSC-85B/93B.
 - (2) In the contingency corps, five AN/TSC-85B and eight AN/TSC-93B provide a low capacity multichannel (6 to 12 channels) range extension capability, independent of terrain and siting restrictions. It provides links from corps main and forward CPs to COSCOM, the subordinate divisions, and other attached units.
 - e. EAC.
 - (1) At EAC, multichannel TACSAT provides connectivity between key EAC headquarters. EAC has been provided six AN/TSC-85B and ten AN/TSC-93B based on distance, terrain, criticality of links, and the need to augment LOS relays.
 - (2) TACSAT provides connectivity between major Army and combined commands in Europe and Korea.
13. MSE.
- a. MSE provides an interface between mobile and fixed subscribers. DGM equipment is used in many places in the MSE system.
 - b. An AN/TTC-39A circuit switch, due to lack of software, cannot directly call MSE. However, an AN/TTC-39A can call a mobile switch which formats the signals for MSE use. The AN/TTC-39D however is fully compatible with the MSE network, both the MSE Node Center Switch and the AN/TTC-39D are Common Baseline Circuit Switch (CBCS).
 - c. The AN/TRC-173/174/175/138A can carry MSE channels and groups. Within the AN/TRC-174/175/138A, groups can be used to carry the MSE information. Within the AN/TRC-173, only the group side can interface with the MSE system. The MSE does not trunk group multiplex (TGM) orderwire super groups. The RLGM and RMC channels can interface with MSE channels at fixed sites.
 - d. The LENS is a mobile, single shelter, microprocessor-based, modular switch with integral communications security (COMSEC) and multiplexing equipment. It can provide switching for up to 150 digital channels. The LENS with the digital group modem (GM) in the AN/TRC-173 shelter via CX-11203 cable is part of the MSE system.
 - e. A 30-line SENS (AN/TTC-48(V)) is used to provide communications support to smaller units. It connects the GM or RLGM/RMC within the AN/TRC-173 via CX-11230 cable and is part of the MSE system.
14. OPORD.
- a. At the end of the planning phase, the OPORD is produced and distributed. The CSCE with its automated capabilities can greatly increase the efficiency of this process. For example, the database for each AN/TTC-39A or AN/TTC-39D within the network is created and distributed as part the OPORD/TSO 1. It can be electronically downloaded into the specific switch with little or no editing.
 - b. A schedule of events should be planned so the command knows exactly what is expected. The schedule should include the following items.
 - (1) A concept briefing to commanders and staff.

Performance Steps

- (2) A technical control meeting with platoon leaders, platoon sergeants, and switch supervisors. (This meeting should cover how to perform MSE and non-MSE interfaces.)
 - (3) A back briefing to brigade/battalion operations.
 - (4) A final OPORD briefing to commanders, staff, and NC leadership. (Issue the OPORD at this time.)
 - (5) The final team packets are issued to battalions for distribution to teams.
 - c. The five-paragraph format of the OPORD is still used. The following key points are mandatory when publishing MSE plans or annexes.
 - (1) Edition of database tapes.
 - (2) COMSEC key distribution.
 - (3) Number of radio access units/mobile subscriber radiotelephone terminal (RAU/MSRT) frequency plans and designation of the active plan.
 - (4) Locations, distribution, loading, and priorities for PALs.
 - (5) Gateway area codes.
 - (6) Priority of RAU coverage (where RAUs should provide coverage).
 - (7) CSCE locations.
15. Installing the backbone.
 - a. In the MSE operation, establishing and sustaining the backbone network (NC-to-NC link) is the most critical element. The objective is a strong multilink system that allows the direct bulk transfer of the key sets to all NSs/LENs and RAU/MSRT frequency plans to all RAUs. Ensuring a strong backbone is established before allowing subscriber connectivity alleviates work-around due to switch software, hardware, or COMSEC problems. This is also true for loading the PAL. All network managers, NS supervisors, and node officers-in-charge (OIC) must remember that a PAL is loaded only once. Network managers must designate which NSs load the PALs and keep track of PALs when they are loaded.
 - b. Once deployed, the OICs follow OPORD procedures for priority of backbone LOS connectivity. All radio links may be worked at the same time; duplication and bypass follow the link priority list. At this stage, the node OICs inform the SCC/SYSCON of their NCs operation including messages back to the SCC. All NSs/LENs must keep the duplication and bypass assignment printed and current. This information is vital when nodal links fail, or as NCs move throughout the network, or when redirection of duplication and bypass occur.
 - (1) As the first backbone link is established, the NS operator verifies link status. He uses the display interswitch link (DIL) screen before preparing to send duplication and bypass to another NS. This ensures the link is initialized and a transmission status of 2 is established. Any other status is unacceptable.
 - (2) Once established, each NS duplicates all virtual trunk groups (3240) and trunk group clusters (TGCs) over the first backbone link. The exceptions are TGCs 1 through 6, unless downsized for a small extension node/radio access unit (SEN/RAU). As the NSs continue to follow their priority list and the second backbone link is established, the NS operator deletes all odd-numbered TGCs and odd virtuals from the first nodal link and duplicates them over the second nodal link.
 - (3) When the duplication and bypass process is complete and the backbone is operational, the NS operator performs bulk transfer of COMSEC keys. To establish a COMSEC error-free network, the bulk transfer of a master key set is sent directly into the correct HUS locations from the leader switch to the subordinate NSs in that node switch group (NSG).
16. Planning guidelines.

NOTE: The mission and unit SOP will determine specific planning guidelines.

 - a. The general planning guidelines for the TRI-TAC system are basically the same as for any communications system.
 - b. The following represents a general planning list:
 - (1) Identify the OPLAN requirements.
 - (2) Review the mission and user request.
 - (3) Determine equipment availability/interoperability.

Performance Steps

- (4) Obtain equipment condition status.
 - (5) Allocate resources based upon availability and OPLAN mission.
 - (6) Outline shortfalls.
 - (7) Engineer the network and link-up with other networks.
 - (8) Allocate capabilities.
 - (a) DCO access.
 - (b) Precedence.
 - (c) Security classmarks.
 - (9) Identify network management (Active, Reserve SSCE).
 - (10) Determine restoral capability (uncommitted equipment).
 - (11) Prepare emergency plans (EUB and duplication list).
 - (12) Prepare the database.
 - (13) Position the redundant (spare) equipment at key positions.
 - (14) Plan and coordinate COMSEC generation distribution.
 - (15) Get TACSAT time.
 - (16) Conduct planning conferences.
 - (a) Nodal.
 - (b) Divisional.
 - (c) Corps.
 - (d) EAC.
 - (e) Task force.
 - (f) Commercial.
 - (g) TACSAT.
17. Planning process.
- a. Review the tactical situation and the commander's guidance/intent.
 - b. Develop an overlay containing the corps and division boundaries and unit location down to brigade level, including any separate battalions (as needed) that require communications support. Annotate on the overlay the number of MSRTs and wire line subscribers that require support by SOP or doctrine.
 - c. Once you have completed plotting the general areas of usage for the MSRTs and the more specific locations of the wire line subscribers, the next step is to choose your RAU locations. Using the high point data, pick the locations that will provide the best coverage, ensuring that all possible areas in the corps/division are covered and that high density MSRT areas (over 26) are covered by more than one RAU. Before laying out your RAUs, check the adjacent divisions and the corps RAU locations to determine to what extent their RAU coverage overlaps into your area.
 - d. Determine extension node locations based on the density of wire line subscribers and location of supported CPs.
 - e. Determine the NC locations by looking at the proposed RAU locations to determine which of them would also support our extension nodes with LOS connectivity. The NC site selection is based largely on the LOS radio links required to tie in extension nodes and the remote RAUs to the backbone network. The locations may have to be adjusted to ensure LOS is available. Connect the NCs to the extension nodes and the remote RAU locations, ensuring each LOS system is feasible. (The SCC signal path profiling feature allows you to calculate the probability of establishing an LOS shot between any two points on your map.) If there are any areas not covered, mark them for NRI service and place your NRIs to fill the gaps.
18. Prepositioned COMSEC keys are required at the NC/LEN, SEN, RAU, and each MSRT subscriber until a connecting network is formed and the SCC can perform a rekey operation. To prepare for COMSEC rekeying, the signal orders must specify the primary and secondary NC as well as the COMSEC leaders/followers to establish responsibility for key distribution during the key cycle.

Performance Steps

- a. The planner must ensure the brigade network technician distributes the prepositioned key set to the battalion network technicians. MSE will not work unless the correct keys are in the correct places in all equipment. Planners must coordinate with adjacent corps and EAC for gateway keys before deployment. A sound key management plan must be understood and practiced by all operators and taught to all subscribers.
 - b. Issue prepositioned keys IAW COMSEC to teams on the day of deployment in the staging area. The Brigade/Battalion COMSEC manager coordinates COMSEC key distribution to all MSRT users.
 - c. COMSEC accountability must be maintained for all keys distributed to each element in the network. Prepositioned COMSEC keys at specified locations ensure the switches and users have the respective keys needed to operate the specific piece of equipment such as switches, MSRTs, and RAUs. The accountability process provides the feedback required to accurately determine where keys are located throughout the network. COMSEC manager worksheets are designed to help network managers plan and conduct orderly distribution of COMSEC keys to MSE teams. Completed worksheets also provide an accounting record for initial key distribution.
19. EUB. If an NS or LENS processor fails, EUB function electronically bypasses the failed switch and transfers essential user access trunk groups directly connected to an NS or LENS to an adjacent NS. This feature provides virtually no interruption in essential user service during a processor failure because all essential users are reaffiliated at the adjacent NS. A minimal loss of service will occur during the time the subscribers are affiliated with the parent NS or LENS that has been returned to service.
20. RAU coverage and layout.
 - a. The RAU (AN/TRC-191) provides network access to mobile radiotelephone subscribers. The RAU can be deployed adjacent to an NS (local) or can be remoted by means of the LOS radio (AN/TRC-173).
 - b. The mobile subscriber gains network access through the RAU. The signal planner deploys RAUs to provide battlefield coverage. One RAU can provide a 15-kilometer (9.3-mile) radius area coverage (planning range) in the area of operations. Following initial affiliation, mobile subscriber affiliation is maintained automatically as it moves from one RAUs range to another. If the mobile subscriber is engaged in a telephone conversation and leaves the servicing RAUs range, the conversation is terminated and must be redialed.
 - c. The RT-1539(P)/G MSRT radio and the RAUs radio are identical and interchangeable. In the MSRT or RAU, the radio operates in a full duplex mode with a high and low frequency band for transmit and receive channels. In the RAU, the radio transmits in the high band and receives in the low band. This procedure is reversed when the radio is used in the MSRT configuration.
 - d. The RAUs are generally used in a local (collocated with an NS) and remote arrangement. This does not mean that both RAUs cannot be remoted. This depends on the availability of an LOS assemblage to support it. The RAUs closest to the FEBA use emitter masking techniques because the RAU constantly emits a marker beacon declaring its availability to affiliated MSRTs. With this in mind, the node platoon leader/sergeant must make important tactical deployment decision about SIGSEC.
21. Placement of extension links.
 - a. The LENS provides local switching and network access for up to 164 digital subscribers. An LEN provides service for large concentrations of users, such as COSCOM/DISCOM or corps/division main. The LEN consists of an OG shelter and an SG shelter. The AN/TRC-174) LOS radio provides network connectivity.

Performance Steps

- b. The SENS provides local switching and network access for 41 subscribers (AN/TCC-48(V)2). A habitual relationship may be established and maintained between extension nodes, including LOS teams and the subscriber CP. The same relationship may be established with Army CPs (ACR, artillery brigades, or ADA brigades). While a habitual relationship may be desired for tactical familiarity and ease in support, EAC extension nodes do not revert to a reserve role when the supported CP/unit assumes a reserve role. In these situations, EAC extension nodes are assigned a revised support role. Habitual relationships may be reestablished when the affected elements return to an active role. In the Army area of operations, essential C2 facilities (Army main, and tactical CPs) should be provided dual LOS network connectivity. This entails assigning additional and redundant extension facilities (SENS/LENs).

22. Operational readiness/internodal link requirements.

- a. An NC is considered operational when one NCS-to-LOS radio link to another LOS-to-NCS is completed, four extension nodes and remote RAUs are ready (interconnected to the switch, antenna erected and aligned, multichannel radio on and tuned), the node processors and related equipment are ready to process traffic, and the local RAU is connected and ready to accept affiliation calls from terminals. An LEN or SEN is considered operational when at least one access LOS link, cable link, or cable link is ready and the node processors and other common equipment are ready to accept traffic from wire subscribers.
- b. Setup time for an NS begins when the LOS and RAU shelters arrive on a properly leveled and cleared site. Setup time for an LEN begins when the shelters arrive on a properly leveled and cleared site and all required subscriber RMCs and junction boxes are preinstalled and connected to the LENS.

NOTE: Only the 9-meter and 15-meter masts are installed. Use of the 30-meter mast is not considered a typical or normal deployment.

- c. Teardown time for the NS begins when the last internode LOS link is disconnected. The system is considered unavailable after a maximum time of 10 minutes during switchover/reaffiliation.

23. Ring code management considerations.

- a. The battalion's SOI must reflect the basic ring tone/channel assignments. Any conflicting or duplicating ring codes that affect the operation of the digital voice orderwire (DVOW) system must be referred to the Brigade/battalion CSCE which controls that link. The Brigade/Battalion CSCE must keep an up-to-date diagram of ring tone assignments for all links and coordinate closely with other CSCE on cross boundary links.
- b. Due to the inability of the NSs DVOW to serve all possible DVOW connections, the node platoon leader will decide on priority users for connectivity to the DVOW system. The node platoon leader must ensure engineering communications are passed by other means to the shelters which do not have the DVOW. Digital nonsecure voice terminal (DNVT) may be connected through the 24 local loops and used for this propose.
- c. All node manager shelters(Nodal CSCE) must keep local diagrams showing all ring tone assignments and changes to channel connections due to faults.

Performance Measures**Results**

- | | | |
|---|---|---|
| 1. Prepare the system/network backbone diagram. (Refer to the mission statement/commander's battle plan, and the OPORD/OPLAN. | P | F |
| 2. Prepare map overlays. | P | F |
| a. Plot corps/division boundaries. | P | F |
| b. Plot site (NC, LENS, SENS, RAU/MSRT, LOS, and so forth). | P | F |
| c. Plot the internodal link requirements. | P | F |
| d. Plot the placement of extension links, to include with and without down-the-hill (DTH) requirements. | P | F |
| e. Plot RAU/MSRT coverage and layout. | P | F |

Performance Measures	Results	
3. Prepare an NC configuration time line.	P	F
4. Prepare a bypass and duplication requirements list.	P	F
5. Prepare an EUB requirements list.	P	F
6. Prepare a COMSEC key distribution/control and procedures checklist to include the following:	P	F
a. Prepositioning COMSEC key requirements.	P	F
b. COMSEC bulk transfer requirements and procedures.	P	F
7. Prepare network requirements for combat net radio interface (CNRI), commercial access, TROPO, TACSAT, non-MSE, and gateway interfaces.	P	F
8. Prepare project/assignment worksheets to be prepared for the AN/TQY-46(V).	P	F
a. General information.	P	F
b. Link data status.	P	F
c. Equipment status.	P	F
d. Personnel status.	P	F
9. Prepare an order message designating corps/division boundaries.	P	F
10. Prepare an order message to request LOS frequency plan.	P	F
11. Prepare an order message to request VHF plan.	P	F
12. Prepare an order message to change/modify the NS database.	P	F
13. Prepare an order message to change/modify the LENS database.	P	F
14. Prepare a subscriber classmarks/profile/assignment.	P	F
15. Review the network plan and make necessary changes prior to final approval.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

FM 11-30
FM 11-37
FM 11-38

Related

FM 11-23
FM 11-41
FM 24-11
TM 11-5800-216-10-2
TM 11-6800-216-10-1

PREPARE THE SIGNAL ANNEX TO THE OPERATIONS ORDER (OPORD)**113-611-5014**

Conditions: You will be provided with an OPORD user requirements, DA Form 2406, and FM 24-16.

Standards: The standards are met when the signal annex is prepared correctly and approved by S3.

Performance Steps

1. In order to prepare the signal annex to the OPORD, it is necessary to review the OPORD in detail so you have a complete understanding of the communications-electronics (CE) responsibility to the mission. To have complete understanding of the mission and implications, you must also understand the contents of the field SOP, SOI, and material status report (DA Form 2406).
2. Preparing the signal annex.
 - a. Heading and classification. Mark the signal annex with the same classification as the basic OPORD. As a minimum, the heading should contain the following: (Reference Figure 5014-A.)
 - b. Paragraph 1: Situation--briefly gives the general picture so subordinate commanders will understand the current situation. Always include the following subparagraphs:
 - (1) Enemy forces--a reference may be made to the signal annex of the command OPORD if the signal annex is available to all elements receiving the signal annex. If the signal annex is not available, pertinent information must be extracted and included in the unit annex.
 - (2) Friendly forces--only information pertinent to the operation of the signal unit is extracted from the signal annex and amplified, where required, to clarify the mission.
 - (3) Attachments and detachments--lists the attached or detached signal units with the effective date and time of the attachment or detachment from the issuing headquarters. If these units are indicated in a task organization, an appropriate reference is entered.
 - (4) Commander's evaluation--this is an optional subparagraph to be used when directed or required. It gives briefly the commander's evaluation of the situation.
 - c. Paragraph 2: Mission--briefly states the missions that are assigned to the unit or assumed by the unit commander. When the missions are as stated in the command operations, service operations, service support orders, or their annexes, the missions may be extracted and amplified as necessary to ensure clarity. This paragraph is never subparagraphed.
 - d. Paragraph 3: Execution--the signal unit commander's concept of the operation and the tasks assigned to each major element of the signal unit are stated in this paragraph. Task assignments may be made by simply referring to the unit SOP if they have been adequately and appropriately covered; otherwise, the tasks assigned to appropriate elements of the units are stated in this paragraph. Overlays, maps, or diagrams may be used to indicate task assignments. The last subparagraph includes appropriate coordinating instructions when instructions are applicable to two or more elements of the command.
 - e. Paragraph 4: Service support--this paragraph contains essential information pertaining to the procedures for obtaining service support not covered by the unit SOP, other orders, or instructions. It lists the locations on the administrative, supply, and maintenance installations that provide support to the unit; or it makes reference to a service support order or annex that contains service support information.
 - f. Paragraph 5: Command and signal--contains the three following subparagraphs:
 - (1) Subparagraph a--contains the appropriate reference to the applicable portion of the SOI to be in effect. It also contains special instructions relating to signal matters, such as instructions on the use of pyrotechnics or restrictions on the employment of any means of communications.
 - (2) Subparagraph b--includes the location of the CP of the issuing unit (if not shown graphically) and the location of the CP. It may also include the CP locations of subordinate units; the CP location of the next higher headquarters; and the designation of the active and standby tactical CPs.

Performance Steps

- (3) Subparagraph c--if a signal annex is not published, this subparagraph will contain information on future locations of major headquarters.
- g. Preparation and distribution--
 - (1) The preparation of the order is a logical and systematic procedure. It is the product of a coordinated effort by the commander and his staff. The ideal situation is to make a formal estimate of the situation, develop a formal plan, and follow with the order. Because of the type of operation and time available, you have the luxury of developing a textbook order. In a tactical environment, surprise is a key factor so you will not sacrifice the element of surprise to mull over the estimate and plan before issuing the order.
 - (2) In developing and distributing the order, consider the time it takes subordinate units to prepare and plan for the operation or the order will lose its effectiveness. If there is not sufficient time to develop a formal OPORD, you may have to use a series of fragmentary orders (FRAGOs), a previously prepared plan, or a combination of directives, orders, and instructions.

Evaluation Preparation: Setup: You will be provided with an OPORD, DA Form 2406, field SOP, and a FRAGO (if applicable). Brief soldier: You must prepare a signal annex for an OPORD.

Performance Measures

Results

1. Analyze the mission as it pertains to CE responsibility.	P	F
NOTE: Review the command/field SOP, SOI, and applicable OPLAN or FRAGO.		
2. Review the equipment condition status report.	P	F
3. Determine the signal system planning requirements.	P	F
4. Prepare the signal annex.	P	F
a. Heading and classification.	P	F
b. Paragraph 1 (situation).	P	F
c. Paragraph 2 (mission).	P	F
d. Paragraph 3 (execution).	P	F
e. Paragraph 4 (service support).	P	F
f. Paragraph 5 (command and signal).	P	F
g. Preparation and distribution.	P	F
5. Prepare appendixes for the signal annex (as required).	P	F
NOTE: A signal unit OPORD is identical in formation to the signal annex of an OPORD. It normally expands the signal annex.		

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
AR 380-5
FM 101-5
FM 24-16

Related

Subject Area 4: Signal System/Installation Operations

DISTRIBUTE COMMUNICATIONS SECURITY (COMSEC) KEYS**113-609-6003**

Conditions: Given an operation order (OPORD) or operation plan (OPLAN), identification of fill devices, identification of the users to receive and sign for the fill devices, and procedures to verify the accountability of keys on COMSEC key control logs.

Standards: The standards are met when you have received COMSEC keys from the COMSEC manager to meet your unit OPORD/OPLAN.

Performance Steps

1. The ECB network is designed to provide secure voice and data communications up to SECRET level with special provisions for TOP SECRET (TS)/sensitive compartmented information (SCI). A combination of physically protected wire lines and cryptographic equipment provides COMSEC.
2. This task will provide you with instructions necessary to check planned distribution of COMSEC keys.
3. An OPORD provides for coordinated actions to carry out the decision of a commander conducting an operation. The development of the OPORD follows the estimate of the situation and development of the OPLAN. An OPLAN may be put into effect at a prescribed time, or on signal; it then becomes the OPORD.
4. Predeployment.
 - a. The primary node switch (PNS) loads network keys in the hardened unique storage (HUS) locations.
 - b. The prepositioned keys stored in KYX-15s are issued to node switches/large extension nodes (NS/LEN).
 - c. Subscriber keys are issued to users IAW their COMSEC account numbers.
 - d. The brigade/battalion signal officer (BSO) stores keys in the user's KYK-13.
 - e. Issue prepositioned keys for the small extension node (SEN), radio access unit (RAU), and line-of-sight (LOS).
 - f. The NS and LENS load prepositioned keys in the HUS locations.
5. Equipment use. Switch COMSEC functions include generating, storing, transferring, and activating COMSEC keys and providing traffic encryption. This is done in the NS (LENS in emergency only) using the activation phases. The automatic key distribution center (AKDC) in the NS generates, transfers, and activates keys. The AKDC is driven by software commands. Using the visual display unit (VDU), the NS operator enters the software commands. The operator can also generate and transfer keys directly from the AKDC. Electronic variables are stored in the HUS. The HUS can store up to 512 variables (256 active and 256 reserve). The loop key generators (LKGs) in the NS and LENS provide key control and key transfer to support end-to-end encryption for digital subscriber/secure voice terminal (DSVT) subscribers on a per call basis.
6. The ECB system requires key accountability for all key generation, transfer, and activation. The accountability process allows the manager to accurately determine where the keys are maintained throughout the network. Accountability is accomplished through a combination of system control center (SCC) project screens, message, and log entries.

Evaluation Preparation: Setup: NA. Brief soldier: You will plan the distribution of COMSEC keys to all network assemblages.

Performance Measures	Results	
1. Review the OPORD/OPLAN to determine COMSEC key distribution and type of generation requirements.	P	F
2. Determine the prepositioning of COMSEC required. Refer to commander's battle plan and OPORD/OPLAN.	P	F
3. Identify the TSEC/KGX-93 AKDC at the primary node center (PNC) to be activated when automatic keying is required.	P	F
4. Identify the fill devices (KYK-15s and KYK-13s) to be loaded when manual keying is required.	P	F
5. Identify the user to receive (pick up and sign for) the fill devices. (Refer to the OPORD/OPLAN.)	P	F
6. Determine the procedures to verify the accountability of keys on COMSEC key control logs.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

Related

TM 11-5805-292-13-1
 TM 11-5805-766-12-1
 TM 11-5805-766-12-2
 TM 11-5805-766-12-3
 TM 11-5805-766-12-4

**CHECK THE ESTABLISHMENT OF A SECURE DIGITAL GROUP MULTIPLEXING RADIO
ASSEMBLAGE
113-606-2051(P)**

Conditions: Given an active signal node with DGM radio assemblages, unit operation order/operation plan(OPORD/ OPLAN), DGM terminal configuration crew assignment sheets, paper maps of area of operation, protractor, compass, and operational site diagram.

Standards: The standards are met when you have checked the establishment of a secure digital group multiplexing radio assemblage to ensure it meets the mission requirements of your unit.

Performance Measures	Results	
1. Verify that the DGM/radio assemblages is at the correct site location.	P	F
2. Ensure site layout is inacording with unit SOP.	P	F
3. Check the installation of the multiplexing radio assemblages.	P	F
4. Check the initialization of the multiplexing radio assemblages.	P	F
5. Evaluate performance and make corrections as required.	P	F

Evaluation Guidance: Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measures is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

TM 11-5820-864-12-1
 TM 11-5820-865-12-1
 TM 11-5820-926-12-1
 TM 11-5820-931-12-1
 TM 11-5820-934-13-1-1
 TM 11-5820-934-13-1-2

Related

DIRECT THE ESTABLISHMENT OF SITE DEFENSE

113-611-5016(P)

Conditions: Given a specified area to defend a signal platoon the unit SOP, map, protractor and operation order /operation plan (OPORD/OPLAN)and the requirement to defend that area.

Standards: The standards are met when site defense is planned, established, and a site defense overlay is prepared.

Performance Steps

1. A well prepared site defense will give advance warning of attackers, reduce the number of possible approach routes, and assist in denying or delaying penetration by the enemy.
2. Listening and observation posts should be established and manned as personnel and mission requirements permit. These posts should be established outside the security zone in protected locations which provide an unobstructed view of possible avenues of enemy approach.
3. Protective physical barriers must be established to provide security for the security zone. The size of the area will be determined by the complexity of the site and the degree of compartmentalization required. Positive barriers should be established to:
 - a. Control vehicular and pedestrian traffic flow.
 - b. Check identification of personnel entering or departing.
 - c. Define a buffer zone for more highly classified areas.
4. Establish fighting positions for both individual and crew-served weapons. Locate these positions to take maximum advantage of natural cover and concealment and provide good, clear fields of fire so a credible defense of the site can be accomplished.
 - a. Keep individual fighting positions as small as possible, but large enough for individual soldiers in full combat gear. Construction overhead protection if time and the tactical situation permit.
 - b. Crew-served weapons fighting positions are larger owing to the requirements for two or more soldiers to man the weapons. When constructing these positions, provide firing positions for both the crew-served weapons and the individual weapons of the soldiers.
5. Use concertina wire when it is available, especially around areas where classified information or material is located. The unit SOP will provide additional guidance on the use of this barrier material.
6. Coordinate command and control of site defense from a centralized location which is identified to all soldiers.
7. In the event it becomes necessary to withdraw from a location, materials ranging from classified papers to equipment may have to be destroyed in place. The unit SOP will contain instructions for the implementation of site destruction plans. The procedures to follow for the destruction of classified material are contained in the training information outline of task 113-573-0001.

Evaluation Preparation: Setup: You will be provided with an operational tactical signal site, equipment, and personnel. Brief soldier: You will direct the establishment of site defense.

Performance Measures

HDR: [Locations for site elements must be determined with consideration for operational requirements, tactical cover, and dispersion.]

Results

- | | | |
|--|---|---|
| 1. Make a tentative plan. | P | F |
| 2. Position security outposts around the site to provide early warning of an enemy approach. | P | F |

Performance Measures	Results	
3. Establish entrance/exit points and lanes for traffic flow within the site.	P	F
4. Coordinate with engineer elements for assistance in establishing field fortifications for communication assemblages, as required.	P	F
5. Direct the location and construction of individual and crew-served fighting positions.	P	F
6. Direct the installation of artificial obstacles, as required.	P	F
7. Identify and locate focal points for command and control of site defense.	P	F
8. Plan for orderly withdrawal.	P	F
a. Specific instructions for destruction of material which cannot be evacuated.	P	F
b. Positive controls for implementation of the destruction plan.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

STP 21-1-SMCT
STP 21-24-SMCT

Related

FM 21-75
FM 24-21

INSTALL A COMMUNICATIONS SYSTEM CONTROL ELEMENT (CSCE)**113-603-1049(P)**

Conditions: You are given CSCE shelter AN/TYQ-30(v)1, AN/TYQ-30(v)2, or AN/TYQ-31 (depending on your unit authorization), operational site diagram, operation order/ operation plan (OPORD/OPLAN). TM 11-5895-1392-12, TM 11-5895-1393 and TB 11-7010-248-10.

Standards: The standards are met when the CSCE is installed and operational to meet the requirements of the unit OPOD/OPLAN.

Evaluation Preparation: Refer to TM 11-5895-1392-12 for shelter type AN/TYQ-30(V)1 and AN/TYQ-30(V)2, TM 11-5895-1392-12 for shelter AN/TYQ-31, and TB 11-7010-248-10 for all performance measures.

Performance Measures**Results**

NOTE: Refer to TM 11-5895-1392-12, for performance measures one through ten on shelter types AN/TYQ-30(V)1 and AN/TYQ-30(V)2. Use TM 11-5895-1393-12 for performance measure one through ten on shelter AN/TYQ-31. Refer to TB 11-7010-248-10 for all remaining performance measures.

1. Position shelter according to operational site diagram and the shelter requirement standards of TM 11-5895-1392-12 or TM 11-5895-1393-12, Chapter 4.	P	F
2. Ground shelters and generators.	P	F
3. Run power cable from generator to shelter power entry panel.	P	F
4. Perform before operation preventive maintenance checks and services (PMCS) on generator.	P	F
5. Perform generator start up and power procedures in accordance with appropriate Technical Manual.	P	F
6. Perform Data Cable connections as required by shelter type.	P	F
7. Perform Remote Terminal Cluster (RTC) installation as required by shelter type. (Not required on AN/TYQ-31).	P	F
8. Conduct Automatic Data Processing (ADP) shelter initial turn-on and self-test.	P	F
9. Conduct RTC initial turn-on and self-test. (Not required on AN/TYQ-31).	P	F
10. Conduct Operation Shelter initial turn-on and self-test. (AN/TYQ-30(V)1 only).	P	F
11. Perform CSCE Startup Procedures in accordance with TB 11-7010-248-10, Chap 4.	P	F
12. Log onto the operational system using the SYSTEM MANAGER (SYSMAN) account.	P	F
13. Perform Communications Utilities functions from the SYSMAN account in accordance with TB 11-7010-248-10, Chap 13.	P	F

Evaluation Guidance: Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measures is failed. If the soldier fails any performance measures, show what was done wrong and how to do it correctly.

References**Required**

TB 11-7010-248-10

Related

References

Required

TM 11-5895-1392-12

TM 11-5895-1393-12

Related

VERIFY THE ESTABLISHMENT OF A RADIO ACCESS UNIT (RAU)**113-625-7010(P)**

Conditions: Given an authorized Table of Organization and Equipment/Table of Distribution and Allowances (TOE/TDA) personnel, equipment with the required generation capability, one AN/TRC-190(V)1 line-of-sight (LOS) radio assemblage with generator, AN/TRC-191 RAU, TMs 11-5800-216-10-1/2/3/4, TMs 11-5820-1022-13-1/2, and TMs 11-5820-1023-1/2/3.

Standards: The standards are met when the remote RAU is operational and awaiting orders from the system control center (SCC) to start transmitting the RAU marker.

Performance Measures**Results**

NOTE: The AN/TRC-191 RAU can be deployed In two configurations, local and remote.

- | | | |
|--|---|---|
| 1. Review the OPORD/OPLAN to determine equipment site locations. | P | F |
| a. Notify the node management facility (NMF) manager when the RAU is operational and ready to activate the RAU. (The backbone system must be installed with a minimum of two solid/active links.) | P | F |
| b. Each NMF manager notifies the SCC operator when the RAU is ready to be activated. | P | F |
| c. When the connected node links are active, the SCC transmits the project order message for the NMF manager to activate the RAU. | P | F |
| d. The NMF directs, monitors, and assists (interacts) the RAU operation or operator as the following functions are performed: | P | F |
| (1) The RAU operator activates the RAU and affiliates the RAU DSVT(s). | P | F |
| (2) The RAU operator then places a call from the RAUs DSVT to all other NMFs of their node switch group. If calls cannot be completed at any time, the operator notifies the NMF manager and waits for instructions. | P | F |
| (3) If calls are completed, the RAU operator affiliates the GLU and notifies the NMF manager. | P | F |
| (4) When all calls cannot be completed, the NMF manager transmits a message to system control center system control (SCC/SYSCON) for communications security (COMSEC) verification, a new set of COMSEC keys, or additional instructions that pertain to the total network operations. | P | F |
| (5) If the GLU has been affiliated, the NMF manager places a call to the GLU directory number and transmits a frequency plan request to the SCC. | P | F |
| (6) The SCC downloads the RAU/MSRT frequency plan to the GLU and sends an operational message "RAU/MSRT frequency plan activated". If no message is received, request the frequency plan again. | P | F |
| (7) After the RAU/MSRT frequency plan message is received and logged by NMF and RAU operators, the RAU operator activates the marker beacon. | P | F |

HDR: Part I. Remote RAU.

- | | | |
|--|---|---|
| 2. Direct the installation and operation of the LOS AN/TRC-190(V)1 radio assemblage. (Refer to TMs 11-5820-1023-13-1/2/3.) | P | F |
| 3. Direct the installation of the remote RAU. (Refer to TMs 11-5820-1022-13-1/2/3.) | P | F |
| 4. Direct the operation of the remote RAU. (Refer to TMs 11-5820-1022-13-1/2/3.) | P | F |
| 5. Evaluate and take corrective action as required. | P | F |

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

TM 11-5800-216-10-1
TM 11-5800-216-10-2
TM 11-5800-216-10-4
TM 11-5820-1022-13-1
TM 11-5820-1022-13-2
TM 11-5820-1022-13-3
TM 11-5820-1023-13-1
TM 11-5820-1023-13-2
TM 11-5820-1023-13-3

Related

TM 11-5820-1027-13&P

DIRECT THE ESTABLISHMENT OF A NODE CENTER AT ECB

113-625-7004(P)

Conditions: Given a requirement to establish a node center (NC) in a MSE- ECB network, operation order/operation plan (OPORD/OPLAN), paper map of the area of operation, compass, protractor, operational site diagram, one Node Switch (NS), AN/TTC-47, four line-of-sight (LOS) radio assemblies AN/TRC-190(V)3, one radio access unit (RAU) AN/TRC-191, SEN AN/TTC48 one node management facility (NMF) AN/TSQ-154, support vehicles as required by mission, and one system control center (SCC) AN/TYQ-46 (if required by OPOrd/OPLAN).

Standards: The standards are met when a NC is sited initialized, operational, and all cables are connected to meet the communication requirements of the unit operation order/operation plan (OPORD/OPLAN).

Performance Measures

Results

NOTE: All performance measures refer to the unit OPOrd/OPLAN.

1. Review the operational site diagram to determine the proper placement of the assemblages.	P	F
2. Direct the installation and operation of the NS.	P	F
3. Direct the installation and operation of the four LOS assemblages.	P	F
4. Direct the installation and operation of the local SEN.	P	F
5. Direct the installation and operation of the local RAU.	P	F
6. Direct the site placement of support vehicles.	P	F
7. Direct the site placement of the SCC (if required by OPOrd/OPLAN).	P	F
8. Plan a field cable/wire system (if required by OPOrd/OPLAN).	P	F
a. Check availability of material number and type or circuits required, number of lines required, number of lines, time permitted for installation, and type of terrain.	P	F
b. Performs reconnaissance of available cable /wire routes.	P	F
c. Selects the proper route for cable/wire that best supports the mission.	P	F
d. Prepares a line route map, if required.	P	F

Evaluation Guidance: Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any performance measures, show what was done wrong and how to do it correctly.

References

Required

Related

FM 11-30
FM 11-37
FM 11-38
FM 24-20
TM 11-5800-216-10-1
TM 11-5800-216-10-2
TM 11-5800-216-10-3
TM 11-5800-216-10-4

Subject Area 5: Signal Network/Site Management

MANAGE THE TACTICAL PACKET NETWORK (TPN)**113-625-6001(P)**

Conditions: As a Network Operation chief in a field environment, given Network Management Central (NMC) AN/TYQ-54, TM 11-5895-1543-13&P-2 and unit operation order/operation plan (OPORD/OPLAN). You are directed to manage start up and shut down of the TPN within your Domain of Responsibility (DOR).

Standards: The standards are met when all the deployed TPN entities within your DOR are registered in the database of the AN/TYQ-54 and you have managed the start up shut down procedures of the TPN within the specifications of the OPORD/OPLAN.

Evaluation Preparation: Refer to TM 11-5895-1543-13-2P/2, Chapter 3 for shelter type AN/TYQ-54 for all performance measures.

Performance Measures	Results	
1. Starts the NMC workstation.	P	F
a. Powers up the NMC workstation	P	F
b. Sets up the data	P	F
c. identifies the NMC	P	F
d. Logs in	P	F
e. Assumes control of DORs.	P	F
2. Shut down the system	P	F
a. Selects Shut Down Option.	P	F
b. Selects EXECUTE Option.	P	F
c. Turns off the machine	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly.

References**Required**

TM 11-5895-1543-13&P-2

Related

TM 11-5895-1543-13&P-1

MANAGE AN ECB NETWORK USING THE SCC**113-625-2078(P)**

Conditions: Given an approved planned and engineered OPORD/OPLAN, to manage an ECB network for the deployment of a corps/division signal brigade. 1. Mission statement/commander's battle plan. 2. SOP. 3. Predeployment software support (PDSS) data for the corps/division network being planned. 4. Team screens and equipment status printouts from the system control center (SCC) AN/TYQ-46(V). 5. High point search profile from SCC. 6. Users request for service. 7. Maps. 8. Overlay plastic. 9. Stylus. 10. Completed project worksheets (to be developed). 11. Team data (changes/updates/assignments) worksheets. 12. SCC team project/assignment worksheets. 13. Node switch (NS) database modification orders (if any). 14. Large extension node (LEN) database modification orders (if any). 15. Communications security (COMSEC) requirements for each team. 16. SOI. 17. Operational SCC. 18. Operation order/operation plan (OPORD/OPLAN). 19. TMs 11-5800-216-10-1/2/3/4. 20. TM 11-5895-1498-12-1. 21. TMs 11-5895-1498-12-2-1/2.

Standards: The standards are met when an ECB network is established and operational to meet requirements of the unit OPORD/OPLAN.

Performance Measures**Results**

: Part I. Predeployment/deployment of an ECB network. NOTES: If time permits, the SCC operator will enter or configure the SCC database and GDE prior to actual deployment. (Refer to TM 11-5895-1374-12-2, Chapters 3 and 6.) During predeloyment, ensure the SCC operator indicates that projects being programmed are entered as an OPENED-PLANNED substate.

1. Direct (supervise/assist) the SCC operator to configure (program) the following ECB network and data into the SCC database.	P	F
NOTE: An ECB system/network manager must know/understand the time requirement for programming/loading the SCC for operation.		
2. Direct (supervise/assist) the SCC operator to enter all system/network project assignments.	P	F
a. Enter team project assignments.	P	F
b. Enter link project assignments.	P	F
c. Enter corps/division boundaries.	P	F
d. Enter bypass and duplication order messages.	P	F
e. Enter EUB project order messages.	P	F
f. Enter COMSEC key distribution project orders messages.	P	F
g. Enter subscriber classmarks/profile/assignments.	P	F
h. Enter COMSEC bulk transfer project messages and procedures.	P	F
i. Enter project messages to effect frequency plans for radio access unit/mobile subscriber radio-telephone terminal (RAU/MSRT) and line-of-sight (LOS) operation.	P	F
j. Enter project order messages to interface combat net radio (CNR), commercial access, tropospheric scatter (TROPO), tactical satellite (TACSAT), non-mobile subscriber equipment (MSE), and gateway.	P	F
3. Direct (supervise/assist) the SCC operator to issue modifications to standard switch databases.	P	F
a. Enter order messages to change/modify the NS database.	P	F
b. Enter order messages to change/modify the LENS database.	P	F
c. Enter order messages to change/modify the small extension node switch (SENS) database.	P	F
4. Review the SCC database to verify each node center (NC) and LEN has an updated database prior to issuing operational and/or technical orders/messages.	P	F

Performance Measures**Results**

Part II. Manage the on-line network. NOTES: All steps listed In Part I are also utilized in Part II but will not be repeated. The steps and substeps listed in Part II are things that can be required during on-line management of the ECB network. They DO NOT have to be performed in any order. There will be times during normal operations/training scenarios when each step or substep will not be required. The system/network manager is not physically located in the SCC, it is imperative that he/she has full knowledge of MAMA and automated system/network requirements in order to perform the following steps.

5. Monitor the operational/technical message printouts generated and received by the SCC from the node management facility (NMF) to maintain/update the ECB network.	P	F
6. Monitor the equipment status reports from the SCC to verify the team capacity and associated radio equipment.	P	F
NOTE: Performance measures 7 and 8 are performed constantly throughout this task and will be the basis of decisions and actions required to manage the ECB network.		
7. Monitor the network graphic display (NGD) to ensure a true graph of the ECB network is displayed. Refer to and compare the NGD with equipment status reports and project assignment worksheets.	P	F
8. Monitor the VDU que display screen reports to ensure the GDU is updated with REAL TIME network data. (Refer to TM 11-5895-1498-12-1, Chapter 3 to perform the following steps.)	P	F
a. Identify/verify the switching team (NS or SEN) indicators.	P	F
NOTE: There are five different team status indicators, but all may not be present at the same time. DO NOT confuse the team indicators with the team status indicators.		
b. Identify/verify the relay to NS status indicators.	P	F
c. Identify/verify the internodal/extension link status indicators.	P	F
d. Identify/verify the relay to extension link status indicators.	P	F
e. Identify/verify the RAU status indicators.	P	F
f. Identify/verify the NIT status indicators.	P	F
9. Analyze the link and network load reports from the SCC to determine the following:	P	F
a. When LOS radio failures exist.	P	F
b. When LOS radio link/trunk saturation exists.	P	F
10. Perform the following network directory management functions (subscriber(s) classmark profiles and affiliation).	P	F
a. Direct, issue, or transmit a common technical message to add, modify, or delete directory, subscriber(s) classmark profiles and/or affiliation to all switches in the network.	P	F
b. Direct, issue, or transmit a dedicated technical message to add, modify, or delete directory subscriber(s) classmark profiles and/or affiliation to all switches in the network.	P	F
11. Monitor, review, and analyze the SCC logbook to perform the following:	P	F
a. Analyze teams and team activity.	P	F
b. Resolve misunderstandings between the SCC operator and team managers.	P	F
12. React to and correct frequency interference.	P	F
13. React to and correct LOS outages.	P	F
14. Direct crash recovery procedures.	P	F
: Part III Manage the ECB network during redeployment.		
15. Plan for ECB backbone network reconfiguration/move.	P	F

Performance Measures	Results	
16. Perform the following steps to move/relocate an NC, LEN, or SEN to a more strategic location on the battlefield.	P	F
a. Perform a terrain and path profile for each link of the network.	P	F
b. Input sufficient data into the SCC database so the SCC can engineer and assign LOS frequencies.	P	F
c. Establish (if/when required) COMSEC key management procedures, keys, key IDs, and key ranges to control the system redeployment/reconfiguration.	P	F
d. Allocate additional resources and personnel to support the move, if needed.	P	F
NOTE: Do not forget to update the SCC and unit database when additional resources and personnel are allocated.		
e. Initiate the operational and/or technical message to effect the move.	P	F
NOTE: When substates are not automatically updated, DO NOT initiate team/link projects to effect the proper display on the GDU.		
17. Enter an order message to request an LOS frequencies plan. (Refer to TM 11-5895-1498-12-1.)	P	F
18. Enter an order message to request a VHF plan. (Refer to TM 11-5895-1498-12-1.)	P	F
: Part IV. Closing the network.		
19. Develop the shutdown, close link/close team project, and worksheets LAW PDSS requirements and communications requirements (length of network operations) developed while performing tasks 113-625-2076 and 113-626-2077.	P	F
20. Perform network closing procedures utilizing the SCC as follows:	P	F
NOTE: Due to the time allotted to down the network, the network manager/SCC operator may elect to close the network by systematically downgrading the services provided by the network.		
a. Issue or generate a close link/close team message to each NMF to terminate network operations. Specify the date and time to terminate operations.	P	F
NOTE: The following steps are based on suggestions provided by the contractor as a fail safe or sure way to accomplish this portion of the task the least amount of problems. The close projects are developed to remove a complete section at a time from the network as displayed on the GDU before shutting down the next section. All close projects in the shutdown process must start with a section that has no tandem connection to a distant switching center in the network.		
b. Select any one of the distant NCs or extension nodes to start the shutdown process.	P	F
(1) Perform a close link project to close the link between the SEN and the switch being dosed.	P	F
(2) Perform a close team project to close each SEN connected to the switch.	P	F
(3) Perform a close team project and a close link project for each team and link of the switching center being closed.	P	F
(4) Perform a close link project to close the link between the switching center being closed and the next connecting switching center.	P	F
(5) Perform a close team project to close the NC or extension node being closed.	P	F
c. Select another NS or extension switch and perform the close link and close team projects necessary to close the distant team and links.	P	F
d. Perform the close team project to close the network after all distant teams have been dosed.	P	F
: Part V. Perform/prepare network summary/review.		
21. Prepare the after action report. (Refer to performance measures 1 through 10.)	P	F
22. Prepare the lessons learned report. (Refer to performance measures 1 through 11.)	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References**Required**

TM 11-5800-216-10-1
TM 11-5800-216-10-2
TM 11-5800-216-10-4
TM 11-5895-1498-12-1
TM 11-5895-1498-12-2-1
TM 11-5895-1498-12-2-2

Related

FM 11-30
FM 11-37
FM 11-38

DIRECT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**113-623-7119(P)**

Conditions: Given the requirement to check the before, during and after preventive maintenance checks and services, 1. TOE/TDA assigned equipment. 2. Assigned personnel. 3. Appropriate TMs. 4. Authorized parts and material.

Standards: Standards are met when the operators have performed their required daily preventive maintenance checks and services in accordance with (IAW) appropriate TMs and completed entries in maintenance forms.

Performance Measures**Results**

NOTE: All performance measures refer to DA Pam 738-750.

1. Coordinates with training officer/NCO for scheduling of maintenance time and training schedules.	P	F
2. Checks that required supplies, equipment, and technical publications are available and utilized.	P	F
3. Checks that equipment operators perform PMCS with their authorized level of maintenance as outlined in the applicable TM.	P	F
4. Checks that correct maintenance procedures, as outlined in applicable TM, are being followed.	P	F
5. Coordinates with applicable section for technical assistance.	P	F
a. Motor sergeant, for vehicle and generator equipment.	P	F
b. Battalion electronic maintenance, for C-E equipment.	P	F
6. Checks that Equipment Inspection and Maintenance Worksheet (DA Form 2404) reflects:	P	F
a. Inspection and services that have been completed.	P	F
b. Uncorrected faults.	P	F
c. Readiness status.	P	F
7. Directs submission of Maintenance Request (DA Form 2407) as required.	P	F
8. Checks that equipment logbook and forms are completed and maintained IAW DA Pam 738-750.	P	F
9. Reports readiness status of all equipment to the maintenance officer/NCO.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
AR 750-1

Related

PRESENT AN INFORMAL C-E SITUATION BRIEFING
113-608-6001

Conditions: Given the requirement to brief visiting personnel, a Communications Systems/Equipment Status Report, Reference materials, Situation map and FM 101-5.

Standards: The briefing presented must: 1. Be presented in a clear, concise, and logical manner. 2. Reflect current communications status.

Evaluation Preparation: Setup: Communications systems/equipment status report, reference materials, and situation map will be available. Brief soldier: You will present a briefing in a clear, concise and logical manner. Reflect current communications status.

Performance Measures	Results	
1. Assembles the information into a logical format. (Refer to FM 101-5, app I, para I-6B.)	P	F
2. Verifies to the maximum possible extent the accuracy of the status of communications facilities.	P	F
3. Presents the briefing using the techniques listed in FM 101-5, appendix I.	P	F
4. Invites and answers questions from the personnel being briefed.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required
FM 101-5

Related

**CONTROL COMMUNICATIONS SUPPORT USING COMMUNICATIONS SYSTEM CONTROL
ELEMENT (CSCE)
113-603-2199(P)**

Conditions: You will be given a operational CSCE shelter AN/TYQ-30(V)1 or AN/TYQ-30(V)2, or AN/TYQ-31, (depending on your unit authorization), operation order operation plan (OPORD/OPLAN), TK-50 distribution tape formatted with Telecommunications Service Order number one (TSO#1) and TB 11-7010-248-10.

Standards: The standards are met when you are planning, engineering, and controlling communications support requirements of the unit operations order/operations plan (OPORD/OPLAN) using the CSCE.

Performance Measures	Results	
NOTE: [Refer to TB 11-7010-1248-10 for all performance measures.]		
1. Perform CSCE System Logon using a valid CSCE username and password.	P	F
2. Loads TK-50 distribution tape formatted with TSO#1.	P	F
3. Verifier the operational role of the CSCE.	P	F
4. Performs Nodal Engineering (AN/TYQ-31 shelters only).	P	F
5. Conducts Circuit Switch (CS) download using the Remote Visual Display Terminal (RVDT) function of the CSCE software. (AN/TYQ-31 shelters only).	P	F
6. Verifies the establishment of inter-shelter communications for the CSCE network.	P	F
7. Utilizes the CSCE to control the tactical communications network.	P	F

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

TB 11-7010-248-10

Related

TM 11-5895-1392-12

TM 11-5895-1393-12

GLOSSARY

Section I **Abbreviations**

(A)PMCS	annual PMCS
(B)PMCS	before operation PMCS
(D)PMCS	daily PMCS
(M)PMCS	monthly PMCS
(Q)PMCS	quarterly PMCS
(TS)	TOP SECRET
(V)	version
(W)PMCS	weekly PMCS
AA	antiaircraft
AAP	Army Apprenticeship Program
AAR	After-Action Review
ABL	automatic brightness limiter
ABT	assign bulk transfer
AC	alternating current/Active Component/assistant commandant
ACC	Army Correspondence Course
access	The process of obtaining data from or placing data into storage.
ACCP	Army Correspondence Course Program
ack	acknowledge
ACOS	ATCCS common operating system
ACP	Allied Communication Publication
ACR	armored cavalry regiment
ACS	Army Community Service
ACSO	assistant corps signal officer
ACT	automatic continuous tuning
AD	archive device

ADA	Air Defense Artillery
ADDs	Army data distribution system
ADP	Automated Data Processing
ADS	automated data system
ADSO	assistant division signal officer
AFATDS	advanced field artillery tactical data system
AFES	Army frequency engineering system
AG	Adjutant General/Adjutant General Corps
AI	Area of Interest
AIRV	area interswitch rekey variable
AIS	automated information system
AIT	Advanced Individual Training
AKDC	automatic key distribution center
AL	angle line
align	To adjust specified variable elements of an item to bring about optimum or desired performance.
AM	amplitude modulation
AMDF	Army Master Data File
AN	annually (frequency code)
ANC	Army Nurse Corps
ANCOC	Advanced Noncommissioned Officers Course
AP	Antipersonnel
APIU	adaptive programmable interface unit
app	appendix
AR	Army Regulation/Army Reserve
ASA	American Standards Association
ASAS	all source analysis system
AT	anti-tank

ATACS	Army tactical communications system
ATC	Army Training Center
ATCCS	Army Tactical Command and Control System
AUTO	automatic
AUTODIN	automatic digital network
B	bimonthly
BA	biannually
BAT	battery
BATCON	battalion control
BC	Branch Code
BCS	battery computer system
Bde	Brigade
BER	bit error rate
BFA	battlefield functional area
BITE	built-in test equipment
BL	low battery/baseline
BM	bimonthly (frequency code)
BN/Bn	Battalion
BNCOC	Basic Noncommissioned Officer Course
BOH	bottom of hill
BOS	Battlefield Operating Systems
BR	battle roster
BSO	brigade/battalion signal officer
C	centigrade
C2	command and control
C3	command, control, and communications
CA	civil affairs or Civil Affairs

CAL	Center of Army Leadership
CAT	category
CB	chemical, biological; common battery; citizens band
CBCS	common baseline circuit switch
CC	Chemical Corps
CCA	circuit card assembly
CCES	COMMCEN extension switch
CCI	controlled cryptographic item
CCS	common channel signaling
CE	communications-electronics
CED	Captured Enemy Documents
CEF	common equipment facility
CEMS	communications-electronics management system
CEN	control electronics nest
CESE	communications equipment support element
CF	Correlation Factor
CG	Commanding General
CH	chaplains
chan	channel
chap	chapter
CHS	common hardware/software
ci	counterintelligence
Cir	Circular
CK	color killer
CMD	color monitor device
CMDSA	COMSEC material direct support activity
CN	Chemical Corps
CNCE	communications nodal control element

CNCE(M)	CNCE (management)
CNR	combat net radio; calibration not required
COMM	communications
COMSEC	Communications Security or communications security
cons	console
cont	continued
COSCOM	Corps Support Command
COU	cable orderwire unit
CP	Command Post
CRI	Criterion-Referenced Instruction
CRIB	card reader insert board
CS	O-chlorobenzyl-malononitrile
CSC	Command and Staff College
CSCE	communications system control element
CSM	Command Sergeant Major
CSPE	communications system planning element
CSS	combat services support/communications switching set
CT	control terminal
CX	Blister agent
DA	Department of the Army
DA Form	Department of the Army Form
DA Pam	Department of the Army Pamphlet
DAR	distortion adaptive receiver
DC	Dental Corps; direct current; District of Columbia
DCO	dial central office
DD Form	Department of Defense Form
DE	directed energy

DEC	Digital Equipment Corporation
dest	destroy
DGM	digital group multiplexing; digital group modem
DIL	display interswitch link
DIS	Distributed Interactive Simulation
DISAC	Defense Information Systems Agency Circular
DISCOM	Division Support Command
distr	distribute; distribution
DIV/Div	Division
DLKF	dual loop key generator
DNI	digital NATO interface
DNVT	digital nonsecure voice telephone
DO	Delivery Order
DoD	Department of Defense
DP	Dual Purpose
DS	direct support
DSCS	Defense Satellite Communications System
DSN	Defense Switchboard Network
DSVT	digital secure voice telephone
DTG	date-time group; digital transmission group
DTH	down-the-hill
DVOW	digital voice orderwire
EAC	echelons above corps
ECB	echelons corps and below
ECCM	electronic counter-counter measures
ECM	electronic countermeasures
ECU	environmental control unit
EEFI	essential elements of friendly information

EL	erector launcher
element	A display of a program instruction.
ELSEC	Electronic Security
EM	end user manual
EN	Corps of Engineers
ENG	electronic news gathering
Engineering	Establishment, operation, maintenance, and control of communications system.
EOW	engineering orderwire
EP	electronic protection
ER	evaluation report
ERF	electronically-remote-fill
ESA	electronic surge arrester
EUB	essential user bypass
EW	electronic warfare
EXEC	execute (MBC procedure)
F	fahrenheit; fail
FA	Functional Area
FEBA	Forward Edge of the Battle Area
FI	Finance Corps
fig	figure
fix	To spray with fixative.
flop	To reverse from right to left, or vice versa.
FM	field manual; frequency modulation; file maintenance
FO	forward observer
FOCA	fiber optic cable assembly
focal point	center of interest.
FOIA	Freedom of Information Act

FOMAU	fiberoptic medium attachment unit
FOR	fiber optics repeater
form	The three-dimensional shape and structure of an object or figure.
frag	fragmentation
FRAGO	fragmentary order
frequency	Cycles per second, measured in hertz (Hz).
FY	Fiscal Year
G	nerve agent
Gate	A performance requirement that must be satisfied to continue training.
GDU	gun display unit
gen	general
GHz	gigahertz
GI	government issue
GLU	group logic unit
GM	group modem
GS	General support
GSE	government supplied equipment
H	blister agent
HD	distilled mustard gas
hdr	header
HDU	hard disk unit
HE	High Explosive
HF	high frequency
HTU	hand-held terminal unit
HUS	hardened unique storage
Hz	hertz
IAW	in accordance with

IC	integrated circuit
ICOM	integrated communications
ID	identification
IF	intermediate frequency
IG	Inspector General
IHFR	improved high frequency radio
IM	information management
IMA	individual mobilization augumentees
IMS	information management system
IN	Infantry
in.	inch
Inf	Infantry
INFO	information addressee
input	The data on which the computer operates, usually entered from the keyboard of mass storage system.
INST	institution training
INT	internal
IP	implementation procedures
IPL	initial program load
IR	infrared
IRE	Institute of Radio Engineering
ISSO	information system security office(r)
JCS	Joint Chiefs of Staff
k (kilobyte)	Used to denote size of memory and can be expressed in bytes or words. Example: 2K = 2048 bytes.
kb/s	kilobits per second
kHz	kilohertz
km	kilometer
L	left

LAN	local area network
LAW	light antitank weapon
LD	Line of Departure
LEN	large extension node
LENS	large extension node switch
less	to delete from
LGM	loop group multiplexer
line	transmission circuit
LKG	loop key generator
LO	Learning Objective
LOS	line of sight
LRU	lowest repairable unit
ltr	letter
M	meter
maint	maintenance
maintenance	The process of keeping equipment (or program) in working order.
MAMA	man/machine
MC	Medical Corps
MCS	maneuver control system
met	meteorological
METL	mission essential task list
MFR	memorandum for record
MHz	Megahertz
MI	Military Intelligence
MIJI	meaconing, intrusion, jamming, and interference
min	minute
MMU	mass memory unit

MO	monthly (frequency code)
mode	A selected method of operation.
modem	modulation/demodulation equipment
MOPP	mission oriented protection positive
mount	To fasten onto a base, such as mounting a picture, photograph, or type proof onto a firm cardboard.
MP	Military Police
MS	methyl salicylate
MSE	mobile subscriber equipment
MSNV	message switch net variable
MSR	Main Supply Route
MSRT	mobile subscriber radiotelephone terminal
MSRV	message switch rekey variable
NA	not applicable
NAI	NATO analog interface
NAIU	NATO analog interface unit
NATO	North Atlantic Treaty Organization
NAVAID	navigational aid
NBC	nuclear, biological, chemical
NC	node center
NCA	National command authority
NCO	noncommissioned officer
NCOIC	Noncommissioned Officer In Charge
NCS	net control station
NET	New Equipment Training
NG	National Guard
NGD	network graphic display
NIC	network interface card

NIT	NATO interface terminal
NMC	nonmission capable
NMF	node management facility
No	number
noise	random spurts of electrical energy or interference. May produce a snowy picture
NR	nonformatted report
NRI	net radio interface
NS	node switch
NSA	National Security Agency
NSG	node switch group
NSV	node support vehicle
NSWT	nonsecure warning tone
NT	network terminal
OCU	orderwire control unit
OD	olive drab
OF	Observed Fire
OG	operations group
OIC	officer in charge
OM	operation manual
OP	Observation Post
OPER	Operation
OPFAC	operational facility
OPLAN	Operations Plan
OPORD	operation order
OPSEC	Operations Security
ORD	Operational Requirements Document
org	originator

OS	operating system
OT	Observer Target
OW	orderwire
P	pass
PA	power amplifier
PAC	Personnel and Administration Center
PAL	preaffiliation subscriber list
Pam	pamphlet
para	paragraph
PC	programmable controller
PCM	pulse code modulation
PCU	portable computer unit
PD	Points of Departure
PDSS	predeployment software support
PE	Practical Exercise
PEP	power entry panel
PL	preservative lubricant
PLA	plain language address
PLAN	resource planning routine
PLDC	Primary Leadership Development Course
PLU	program load unit
PMCS	preventive maintenance checks and services
PME	professional military education
PNC	primary node center
PNS	primary node switch
POC	Point of Contact
POL	Petroleum, Oils, and Lubricants
pot	(potentiometer) A sound-volume control.

power	the rate at which work is done. The unit of measurement is watt
power ent	power entrance
PP	Passage Point
prev	preventive
Procedure	A standard and detailed course of action that describes how to perform a task.
PT	physical training
pub	publication
Q	quarterly
QT	quarterly (frequency code)
R	right/radius
RA	Regular Army
Radio frequency	Any frequency of electrical energy, usually above 20 kHz, capable of propagation into space.
RATT	Radioteletype
RAU	radio access unit
RC	Reserve Component/remote control
rcv	receive
RD	data requirements
REC	receive
RES	Radiation Exposure Status
ret	retire
RETRANS	retransmission station
reverse	See flop.
RF	Reserve Forces
RFD	radio frequency direction
RFO	reason for outage
RI	routing indicator

RIB	The separate red, green, and blue color (chrominance) or "C" video signals.
RIF	reduction-in-force
RLGM	remote loop group multiplexer
RM	reparable management
RMC	remote multiplexer combiner
RO	receive only
RSS	routing subsystem
RT	receiver-transmitter/remote terminal
S	safe
S1	Adjutant (US Army)
S2	Battalion Intelligence Officer
S3	Battalion Operations Officer
S4	Battalion Supply Officer
SA	semiannually (frequency code)
SAT	Systems Approach to Training
saturation	The purity or density of a color.
SB	Supply Bulletin
SC	Signal Corps/single-channel
SCC	system control center
SCCOMP	system control center off-line maintenance program
SCI	sensitive compartmented information
SDNRI	secure digital net radio interface unit
SDT	Self-Development Test
SDU	storage device unit
sec	second
SEN	Satellite Education Network
SENS	small extension node switch

SEP	signal entry panel
SER	SATCOM equipment report
setup	The separation in level between blanking and reference black levels (normally 7.5 IRE).
SF	Standard Form
SG	switching group
SH	sexual harassment
SHF	super high frequency
SI	Skill Identifier
SIDPERS	standard installation/division personnel system
SIG	Signal
SIGSEC	Signal Security
SINCGARS	Single-Channel Ground and Airborne Radio System
SM	soldier's manual
SMCT	Soldier's Manual of Common Tasks
SN	serial number
SOI	signal operation instructions
SOP	Standing Operating Procedure
SORL	select/modify operating role
SQ	system cue
SR	Supply Route
SRWBR	short range wideband radio system
SSA	supply support activity
SST	single subscriber terminal
ST	Special Text
STANAG	Standardization Agreement
STF	Special Task Force
STP	soldier training publication

switches	mechanical devices for closing, opening or changing the connections in an electrical circuit
SYSCON	system control
Tab	Table
TACFIRE	tactical fire direction system
TACSAT	tactical satellite
TAMMIS	Theater Army Medical Management Information System
TB	Technical Bulletin
TC	= Technical Coordinator; = Training Circular
TCC	terrestrial critical control unit
TCMS	tactical communications management system
TCO	telecommunications certification officer
TCU	transportable computer unit
TD	Training Development
TDA	Table of Distribution and Allowance
TED	trunk encryption device
TEMS	tactical communications management system
TES	Tactical Engagement System
TG	trainer's guide
TGC	trunk group cluster
TGM	trunk group multiplexer
TI	test instrument
TIP	tactical interface point
TK	tool kit
TL	training location
TM	technical manual
TMDE	Test Measurement and Diagnostic Equipment
TO	technical order

TOD	sync time
TOE	Table of Organization and Equipment
TOH	top-of-hill
TP	Target Practice/test plan
TR	TRADOC Regulation
TRADOC	Training and Doctrine Command
TRANSEC	transmission security
TRI-TAC	tri-service tactical
TROPO	tropospheric scatter
TS	TOP SECRET
TSB	trunk signaling buffer
TSC	Training Support Center
TSC(A)	theater signal command (Army)
TSEC	telecommunications security
TSO	telecommunications service order
TW	target width
U	up
UHF	ultra high frequency
UL	unit level
ULCS	unit level circuit switches
UNIT	brevity code for "trained in the unit"
uplink	Earth station transmitter used to send television signals from the earth to a satellite.
US	United States
USAPC	United States Army Publications Center
user	Any person or organization who needs or uses a terminal (attached to a computer).
V	volt/nerve agent
VAC	voltage alternating current

VAX	virtual address extension
VDC	voltage direct current
VDT	video display terminal
VDU	video display unit
vehicle	A liquid used as the carrier of pigment in the paint.
VHF	very high frequency
VI	Visual Information
VMS	virtual memory system
VP	vanishing point
w/	with
WHCA	White House Communications Agency
WO	Warrant Officer
XMIT	transmit

Section II

Terms

Action Verb

Verb that conveys action/behaviors and reflects the type of performance that is to occur (i.e., place, cut, drive, open, hold). Action verbs must reflect behaviors that are measurable, observable, verifiable, and reliable.

Army Training and Evaluation Program (ARTEP)

The US Army's collective training program. ARTEP establishes unit training objectives critical to unit survival and performance in combat. They combine the training and the evaluation processes into one integrated function. The ARTEP is a training program and not a test. The sole purpose of external evaluation under this program is to diagnose unit requirements for future training.

Critical Task Selection Board

A management device which serves a quality control function in critical task selection. The board reviews the total task inventory and job performance data and recommends tasks for approval to the appropriate authority as critical tasks.

Critical Task

A task which is essential for accomplishment of the unit mission, successful individual skill performance and/or survival in battle, and requires training.

Cross Training

The opportunity for an individual to train to additional jobs within his or her MOS.

Duty Position

The job a service member performs within the unit. AR 611-201 has names of official duty positions for each MOS.

Individual Training Evaluation Program (ITEP)

a program which requires commanders to routinely evaluate soldier ability to perform non-specific tasks critical to the unit mission

Integrated training

Training of a critical task in a formal course of instruction by integrating or consolidating the proponent-provided TSP material into an existing lesson. The task MAY be one in which the performer has received prior training, i.e., it is best used to sustain/refine previously acquired skills. The training must be applicable to the block of instruction in which it is integrated; trains the task to standard; and evaluates task performance during instruction under conditions prescribed in the TSP.

Military Occupational Specialty (MOS) Code

A fixed number which indicates a given military occupational specialty. Also known as military occupational number and specification serial number.

MOS training plan (MTP)

The MTP is a guide for the conduct of individual training in units. An MTP is developed for each MOS and addresses all skill levels of an MOS and all duty positions. The MTP lists all MOS-specific and shared critical tasks for which the MOS is responsible. It will not include common tasks.

Shared task

A critical task performed by soldiers from two or more MOS's.

Skill level

Identifies task proficiency, or ability typically required for successful performance at the grade with which the skill level is associated. The skill levels by grade are shown below: Skill levels => 1 2 3 4 5; Enlisted E 1/2, 3/4, 5, 6, 7, 8/9; Warrant W, 1/2, 3, 4, 5; Officers O 1/2, 3, 4, 5, 6

Task Summary (TS)

A statement of the task in an action-verb format plus all essential performance measures. A standard format fully describes the task for the soldier in the field. It will accommodate any product or process task whether it is in fixed sequence, alternate sequence, or combination. The task summary is used both to train the soldier to perform the task and to evaluate the soldier's ability to perform the task (within testing constraints).

Training Objective

A statement that describes the desired outcome of a training activity in the unit. It consists of the following three parts: task, condition(s), standard.

Train-Up

The process of increasing the skills and knowledge of an individual to a higher skill level in the appropriate MOS. (It may involve certification.)

REFERENCES

Army Regulations

AR 750-1 Army Material Maintenance Policy and Retail Maintenance Operations. 1 Aug 97.

Field Manuals

FM 101-5 Staff Organization and Operations. 31 May 97.
 FM 11-23 Theater Communications Command (Army), 28 Nov 72
 FM 11-30 MSE Communications in the Corps/Division, 27 Feb 91
 FM 11-37 MSE Primer for Small-Unit Leaders, 14 Nov 90
 FM 11-38 MSE System Management and Control, 4 Apr 91
 FM 11-41 Signal Support: Echelons and Below (ECB). 18 December 1991
 FM 19-30 Physical Security. 1 Mar 79.
 FM 21-75 Combat Skills Of The Soldier
 FM 24-1 Signal Support In The Airland Battle. 15 Oct 90.
 FM 24-11 Tactical Satellite Communications, 20 Sep 90
 FM 24-18 Tactical Single-Channel Radio Communications Techniques. 30 Sep 87
 FM 24-20 (Superseded by TC 24-20)
 FM 24-21 (Superseded by TC 24-21)
 FM 24-33 Communications Techniques Electronic Counter-Countermeasures
 FM 34-62 SS/FM 34-60, Feb 90

Other Product Types

TB 11-5895-1544-10-1 Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994 (C1)
 TB 11-5895-1544-10-2 Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994
 TM 11-5805-292-13-1 *** Created by ASAT Convert ***

Technical Bulletins

TB 11-7010-248-10 Software Operator's Manual for Version 2.4 Integrated Network Management System (INMS) for the CSCE AN/TYQ-30() & AN/TYQ-31

Technical Manuals

TM 11-5800-216-10 Operator Manual MSE System
 TM 11-5800-216-10-1 System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
 TM 11-5800-216-10-2 System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
 TM 11-5800-216-10-4 System Manual for Mobile Subscriber Equipment MSE
 TM 11-5805-766-12-1 Operator's and Unit Maintenance Manual for Node Center Switch AN/TTC-47C(V)1 Consisting of Operations Group OL-413C(V)1/TTC-47C(V), Switching Group ON-306C(V)1/TTC-47C(V), and Node Center Switch AN/TTC-47C(V)2 Consisting of Operations Group
 TM 11-5805-766-12-2 Operator's and Unit Maintenance Manual Node Center Switch AN/TTC-47, Node Center Switch AN/TTC-47A(V)1, Node Center Switch AN/TTC-47B(V)1, Node Center Switch AN/TTC-47C(V)1, and Node Center Switch AN/TTC-47C(V)2. (C1) 1 Sep 91

TM 11-5805-766-12-3	Operator's and Unit Maintenance Manual Node Center Switch AN/TTC-47 Consisting of Operations Group OL-413/TTC-47, Switching Group N-306/TTC-47, and Node Center Switch AN/TTC-47A(V)1 Consisting of Operations Group OL-413A(V)1/TTC-47A(V), Swi
TM 11-5805-766-12-4	Operator's and Unit Maintenance Manual for Node Center Switch AN/TTC-47C(V)1 Consisting of Operations Group OL-413C(V)1/TTC-47C(V), Switching Group ON-306C(V)1/TTC-47C(V), and Node Center Switch AN/TTC-47C(V)2 Consisting of Operations Group
TM 11-5820-1022-13-1	Operator's, Unit and Direct Support Maintenance Manual for Radio Access Unit AN/TRC-191 and Radio Access Unit AN/TRC-191A(V)1. (C1-4) 1 March 1989
TM 11-5820-1022-13-2	Operator's, Unit and Direct Support Maintenance Manual for Radio Access Unit AN/TRC-191 and Radio Access Unit AN/TRC-191A(V)1. (C1-4) 1 February 1990
TM 11-5820-1023-13	Operator's Unit and Intermediate Direct Support Maintenance Manual Line-of-Site Multichannel Radio Terminal AN/TRC-190(V)1, (V)2, (V)3, and (V)4 MSE
TM 11-5820-1023-13-1	Operator's Unit, and Intermediate Direct Support Maintenance Manual Line-of-Sight Multichannel Radio Terminal AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC-190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, AN/TRC-190A(V)4
TM 11-5820-1023-13-2	Operator's, Unit, and Direct Support Maintenance Manual for Line-of-Sight Multichannel Radio Terminal AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC 190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, AN/TRC-190A(V)4. (C1-4)
TM 11-5820-1023-13-3	Operator's Unit, and Intermediate Direct Support Maintenance Manual for Line-of-Sight Multichannel Radio Terminal, AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC-190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, and AN/TRC
TM 11-5820-1027-13&P	Operator's, Unit and Direct Support Maintenance Manual Including Repair Parts and Special Tools List for Receiver-ransmitter RT-1539(P)A(C)/G, (C1-2) 1 Mar 89
TM 11-5820-864-12-1	Operator's and Unit Maintenance Manual for Radio Repeater Set AN/TRC-174, Vol I (Reprinted w/Basic Inclosure C1)
TM 11-5820-865-12-1	Operator's and Unit Maintenance Manual for Radio Terminal Set AN/TRC-173 (Reprinted w/Basic Inclosure C1-2)
TM 11-5820-926-12-1	Operator's and Unit Maintenance Manual for Radio Repeater Set AN/TRC-138A, Vol I (Reprinted w/Basic Inclosure C1)
TM 11-5820-931-12-1	Operator's and Unit Maintenance Manual for Radio Terminal Set AN/TRC-175 (Reprinted w/Basic Inclosure C1)
TM 11-5820-934-13-1-1	Combined Operation and Maintenance Instructions Organizational and Intermediate Radio Terminal Set, AN/TRC-170(V)2
TM 11-5820-934-13-1-2	Combined Operation and Maintenance Instructions for Organizational and Intermediate Support for Radio Terminal Set AN/TRC-170(V)2. (C1-4) 1 August 1985
TM 11-5895-1392-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Signal Processor AN/TYQ-30(V)1, AN/TYQ-30(V)2. (C1) 15 September 1991
TM 11-5895-1393-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Nodal Processor AN/TYQ-31(V). (C1) 15 September 1991
TM 11-5895-1498-12-1	Operator's and Unit Maintenance Manual for System Control Center, Division AN/TYQ-46(V), Consisting of Technical Shelter OL-489/TYQ-

	46(V), Management/Planning Shelter OL-490/TYQ-46(V). 1 January 1991
TM 11-5895-1498-12-2-1	Operator's and Unit Maintenance Manual for System Control Center, Telephone Routing AN/TYQ-46(V)1 and AN/TYQ-46(V)2 Consisting of Technical Shelter OL-489/TYQ-46(V) and Management/Planning Shelter OL-490/TYQ-46(V). 1 Sep 91
TM 11-5895-1498-12-2-2	Operator's And Unit Maintenance Manual For System Control Center, Telephone Routing AN/TYQ-46(V)1 AN/TYQ-46(V)2 Consisting Of Technical Shelter OL-489/TYQ-46(V) Management/Planning Shelter OL-490/TYQ-46(V). 1 Nov 93
TM 11-5895-1544-13&P	Operator's, Unit, and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) for Network Planning Terminal AN/UYK-100 MSE. 1 November 1993

Army Regulations

AR 380-40	(C) Policy for Safeguarding and Controlling Communications Security (COMSEC) Material (U), 01 Sep 94
AR 380-5	Department Of The Army Information Security Program. 25 Feb 88.
AR 750-1	Army Material Maintenance Policy and Retail Maintenance Operations. 1 Aug 97.

Field Manuals

FM 101-5	Staff Organization and Operations. 31 May 97.
FM 11-30	MSE Communications in the Corps/Division, 27 Feb 91
FM 11-37	MSE Primer for Small-Unit Leaders, 14 Nov 90
FM 11-38	MSE System Management and Control, 4 Apr 91
FM 24-1	Signal Support In The Airland Battle. 15 Oct 90.
FM 24-16	Communications-Electronics: Operations, Orders, Records and Reports. 7 April 1978
FM 24-33	Communications Techniques Electronic Counter-Countermeasures
FM 71-1	Tank and Mechanized Infantry Company Team

Joint Publications

CJCSM 6231.04	JTS Manual for Employing Joint Tactical Communications
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Other Product Types

OPORD	OPERATION ORDER
TB 11-5895-1544-10-1	Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994 (C1)
TB 11-5895-1544-10-2	Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994

Soldier's Training Publications

STP 21-1-SMCT	SOLDIER'S MANUAL OF COMMON TASKS SKILL LEVEL 1
STP 21-24-SMCT	SOLDIER'S MANUAL OF COMMON TASKS (SMCT) SKILL LEVEL 2-4

Technical Bulletins

TB 11-7010-248-10	Software Operator's Manual for Version 2.4 Integrated Network Management System (INMS) for the CSCE AN/TYQ-30() & AN/TYQ-31
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Technical Manuals

TM 11-5800-216-10-1	System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
TM 11-5800-216-10-2	System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
TM 11-5800-216-10-4	System Manual for Mobile Subscriber Equipment MSE
TM 11-5820-1022-13-1	Operator's, Unit and Direct Support Maintenance Manual for Radio Access Unit AN/TRC-191 and Radio Access Unit AN/TRC-191A(V)1. (C1-4) 1 March 1989
TM 11-5820-1022-13-2	Operator's, Unit and Direct Support Maintenance Manual for Radio Access Unit AN/TRC-191 and Radio Access Unit AN/TRC-191A(V)1. (C1-4) 1 February 1990
TM 11-5820-1022-13-3	Operator's, Unit and Direct Support Maintenance Manual for Radio Access Unit, AN/TRC-191 and Radio Access Unit, AN/TRC-191A(V)1. (C1-4) 19 January 1988
TM 11-5820-1023-13-1	Operator's Unit, and Intermediate Direct Support Maintenance Manual Line-of-Sight Multichannel Radio Terminal AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC-190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, AN/TRC-190A(V)4
TM 11-5820-1023-13-2	Operator's, Unit, and Direct Support Maintenance Manual for Line-of-Sight Multichannel Radio Terminal AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC 190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, AN/TRC-190A(V)4. (C1-4)
TM 11-5820-1023-13-3	Operator's Unit, and Intermediate Direct Support Maintenance Manual for Line-of-Sight Multichannel Radio Terminal, AN/TRC-190(V)1, AN/TRC-190A(V)1, AN/TRC-190(V)2, AN/TRC-190A(V)2, AN/TRC-190(V)3, AN/TRC-190A(V)3, AN/TRC-190(V)4, and AN/TRC
TM 11-5820-864-12-1	Operator's and Unit Maintenance Manual for Radio Repeater Set AN/TRC-174, Vol I (Reprinted w/Basic Inclosure C1)
TM 11-5820-865-12-1	Operator's and Unit Maintenance Manual for Radio Terminal Set AN/TRC-173 (Reprinted w/Basic Inclosure C1-2)
TM 11-5820-926-12-1	Operator's and Unit Maintenance Manual for Radio Repeater Set AN/TRC-138A, Vol I (Reprinted w/Basic Inclosure C1)
TM 11-5820-931-12-1	Operator's and Unit Maintenance Manual for Radio Terminal Set AN/TRC-175 (Reprinted w/Basic Inclosure C1)
TM 11-5820-934-13-1-1	Combined Operation and Maintenance Instructions Organizational and Intermediate Radio Terminal Set, AN/TRC-170(V)2
TM 11-5820-934-13-1-2	Combined Operation and Maintenance Instructions for Organizational and Intermediate Support for Radio Terminal Set AN/TRC-170(V)2. (C1-4) 1 August 1985
TM 11-5895-1392-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Signal Processor AN/TYQ-30(V)1, AN/TYQ-30(V)2. (C1) 15 September 1991
TM 11-5895-1393-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Nodal Processor AN/TYQ-31(V). (C1) 15 September 1991
TM 11-5895-1498-12-1	Operator's and Unit Maintenance Manual for System Control Center, Division AN/TYQ-46(V), Consisting of Technical Shelter OL-489/TYQ-46(V), Management/Planning Shelter OL-490/TYQ-46(V). 1 January 1991
TM 11-5895-1498-12-2-1	Operator's and Unit Maintenance Manual for System Control Center, Telephone Routing AN/TYQ-46(V)1 and AN/TYQ-46(V)2 Consisting of

	Technical Shelter OL-489/TYQ-46(V) and Management/Planning Shelter OL-490/TYQ-46(V). 1 Sep 91
TM 11-5895-1498-12-2-2	Operator's And Unit Maintenance Manual For System Control Center, Telephone Routing AN/TYQ-46(V)1 AN/TYQ-46(V)2 Consisting Of Technical Shelter OL-489/TYQ-46(V) Management/Planning Shelter OL-490/TYQ-46(V). 1 Nov 93
TM 11-5895-1543-13&P-1	OPERATOR'S UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR NETWORK MANAGEMENT CENTRAL AN/TYQ-54
TM 11-5895-1543-13&P-2	OPERATOR'S, UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR NETWORK MANAGEMENT CENTRAL AN/TYQ-54

Related Publications

Related publications are sources of additional information. They are not required in order to understand this publication.

Army Correspondence Course Program Subcourses

IT0464	SIGNAL SECURITY AND OPERATIONAL SECURITY
SS 0456	Communications Security (COMSEC).
SS 0496	Signal Security.

Army Regulations

AR 380-5	Department Of The Army Information Security Program. 25 Feb 88.
AR 530-1	Operations Security (OPSEC). 3 Mar 95.

Field Manuals

FM 101-5-1	Operational Terms and Graphics. 30 Sep 97.
FM 11-23	Theater Communications Command (Army), 28 Nov 72
FM 11-30	MSE Communications in the Corps/Division, 27 Feb 91
FM 11-37	MSE Primer for Small-Unit Leaders, 14 Nov 90
FM 11-38	MSE System Management and Control, 4 Apr 91
FM 11-41	Signal Support: Echelons and Below (ECB). 18 December 1991
FM 19-30	Physical Security. 1 Mar 79.
FM 21-75	Combat Skills Of The Soldier
FM 24-11	Tactical Satellite Communications, 20 Sep 90
FM 24-18	Tactical Single-Channel Radio Communications Techniques. 30 Sep 87
FM 24-20	(Superseded by TC 24-20)
FM 24-21	(Superseded by TC 24-21)
FM 34-62	SS/FM 34-60, Feb 90

Other Product Types

TB 11-5895-1544-10-1	Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994 (C1)
TB 11-5895-1544-10-2	Operator's Manual for Mobile Subscriber Equipment Network Planning Terminal (MSE-NPT). 1 May 1994

TB 380-40(1-5)	(C) Key Variable Management and Cryptosetting for Electronically Keyed COMSEC Systems (U). 28 July 1986
TM 11-5805-292-13-1 Unit SOP	*** Created by ASAT Convert *** Standing Operating Procedure
Technical Manuals	
TM 11-5800-216-10-1	System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
TM 11-5800-216-10-2	System Manual for Mobile Subscriber Equipment MSE (Reprinted w/Basic Incl C1-2)
TM 11-5800-216-10-3	(C) System Manual Mobile Subscriber Equipment Appendix K COMSEC Key Management (U) MSE. 01 Nov 94.
TM 11-5800-216-10-4	System Manual for Mobile Subscriber Equipment MSE
TM 11-5805-766-12-1	Operator's and Unit Maintenance Manual for Node Center Switch AN/TTC-47C(V)1 Consisting of Operations Group OL-413C(V)1/TTC-47C(V), Switching Group ON-306C(V)1/TTC-47C(V), and Node Center Switch AN/TTC-47C(V)2 Consisting of Operations Group
TM 11-5805-766-12-2	Operator's and Unit Maintenance Manual Node Center Switch AN/TTC-47, Node Center Switch AN/TTC-47A(V)1, Node Center Switch AN/TTC-47B(V)1, Node Center Switch AN/TTC-47C(V)1, and Node Center Switch AN/TTC-47C(V)2. (C1) 1 Sep 91
TM 11-5805-766-12-3	Operator's and Unit Maintenance Manual Node Center Switch AN/TTC-47 Consisting of Operations Group OL-413/TTC-47, Switching Group N-306/TTC-47, and Node Center Switch AN/TTC-47A(V)1 Consisting of Operations Group OL-413A(V)1/TTC-47A(V), Swi
TM 11-5805-766-12-4	Operator's and Unit Maintenance Manual for Node Center Switch AN/TTC-47C(V)1 Consisting of Operations Group OL-413C(V)1/TTC-47C(V), Switching Group ON-306C(V)1/TTC-47C(V), and Node Center Switch AN/TTC-47C(V)2 Consisting of Operations Group
TM 11-5820-1027-13&P	Operator's, Unit and Direct Support Maintenance Manual Including Repair Parts and Special Tools List for Receiver-transmitter RT-1539(P)A(C)/G, (C1-2) 1 Mar 89
TM 11-5895-1392-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Signal Processor AN/TYQ-30(V)1, AN/TYQ-30(V)2. (C1) 15 September 1991
TM 11-5895-1393-12	Operator's and Unit Maintenance Manual for Communications System, Control Element, Nodal Processor AN/TYQ-31(V). (C1) 15 September 1991
TM 11-5895-1543-13&P-1	OPERATOR'S UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR NETWORK MANAGEMENT CENTRAL AN/TYQ-54
TM 11-5895-1544-13&P	Operator's, Unit, and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) for Network Planning Terminal AN/UYK-100 MSE. 1 November 1993
TM 11-6800-216-10-1	not found in Pam 25-30